

The impacts of rural electrification on labour market outcomes in developing countries: Evidence from India and South Africa

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Abstract

This cross-country study estimates the effect of household electrification on labour market outcomes for rural individuals in India and South Africa, two developing countries that have implemented large-scale rural electrification schemes in recent decades. Three identification strategies are used: instrumental variables, propensity score matching, and panel fixed and random effects estimation. We focus on three indicators of labour market success: employment, earnings, and hours worked. We find that for India, electrification raises earnings but decreases hours worked for men. For women, electrification raises the probability of being in paid employment, but the results for earnings and hours worked differ across estimation techniques. For South Africa, there is no employment benefit of electrification, and the results are generally more muted. Access to electricity raises earnings, but only significantly so for women, and raises hours worked, but only significantly so for men. Our findings suggest that the benefits of electrification do not accrue universally, but rather depend on gender roles and the labour absorptive capacity of the economy.

1. Introduction

The role of electricity in driving growth and development has been an area of much debate over the last few decades. Recently, ensuring that all individuals have access to affordable and reliable sources of modern energy was explicitly set out as one of the United Nations' Sustainable Development Goals. While industrialized nations have prospered from the pervasiveness of electricity, electricity access is lacking in many developing countries, with the problem being particularly chronic in rural areas. Around 45% of rural households in India (Census, 2011a) and 24% of the rural population of South Africa (Census, 2011b) do not have access to electricity. For a large number of households which do have electricity, reliable supply remains a major issue. To this end, rural electrification programmes with an aim to achieve universal access to electricity have been launched across many developing countries e.g. *Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY)* scheme in India and post-apartheid electrification drives in South Africa. The role and intent of these electrification programmes is not only to provide access to electricity but also to improve the overall well-being of people (Khandker et al., 2012). Barnes and Binswanger (1986) highlight the "blind faith" placed on rural electrification to solve all the problems faced by rural people. They note that "advancing power lines into rural areas has been synonymous with providing the necessary infrastructure for bringing rural areas quickly to higher levels of development". However, it is not clear that such programmes result in increases in household wealth or employment.

In spite of these recent efforts evidence of impacts of rural electrification on labour supply and wages still remains weak. In general, besides being inconclusive, the case- and region-specific nature of these studies makes it difficult to generalize to other developing country contexts. In light of this, we employ a cross-country comparative study using multiple

identification strategies and recent data to ascertain the causal impacts of rural electrification on labour market outcomes – particularly on those of women. This study aims to evaluate the effectiveness of rural electrification in enhancing labour market outcomes in two major developing countries, namely India and South Africa.

The analysis is conducted in the form of a comparative study in order to provide insight into the mechanisms by which electrification generates labour market effects. Both countries have experienced large-scale electrification programmes in recent decades, which have substantially increased household access to electricity, although rural areas remain underserved. However, the nature of the labour markets in the two countries is very different, in terms of features such as access to employment, types of work, and the distribution of earnings. If the study finds that the impact of electrification is similar in both countries despite these large differences, then it is likely that the conclusions are quite generally applicable. In contrast, if outcomes differ in the two countries, then the impacts of electrification programmes are location and case-specific, and must be evaluated on a case-by-case basis. A cross-country comparison of how access to electricity affects labour market outcomes therefore enhances our understanding of the causal links between electrification and wellbeing. Of particular interest is the extent to which rural electrification affects employment and earnings for women, and thus promotes inclusive and sustainable growth.

The paper uses three key identification strategies in order to assess the causal effect of rural electrification and to assess the robustness of the findings. First, instrumental variable estimation is conducted at a cross-sectional level in order to control for non-random household-level access to electricity. Second, a propensity score matching method is used to compensate for the lack of a selection rule for randomizing households into treatment and

control groups. Third, unobserved heterogeneity that may be correlated with both household access to electricity and labour market success is corrected by applying panel data analysis techniques. The panel estimates, and particularly those produced through fixed effects estimation, provide the most reliable and informative results.

The key findings of the paper are that electrification improves some labour market outcomes, but that the nature and extent of the impact of access to electricity differs across labour market indicators, gender, and estimation method. The most robust findings for India are that access to electricity increases the probability of working in paid employment for women, and increases annual earnings for men. For South Africa, there are fewer labour market impacts, which is consistent with a labour market with less absorptive capacity, although there is slight evidence of improvements in earning for women and increased hours spent in paid employment for both genders.

The remainder of the paper is structured as follows. Section 2 briefly outlines the electrification programmes that have taken place in both countries, and the nature of the countries' labour markets. This section provides the context in which the labour market effects of electrification will be studied. Section 3 reviews the existing literature on the impacts of electrification, while Section 4 outlines the research methods used in the paper. The data used for the study are discussed in Section 5, which also presents descriptive statistics of individuals living in electrified and non-electrified rural households. The econometric estimates obtained are presented thereafter, focusing on the estimation of the impact of rural electrification on three key labour market outcomes: employment status, hours worked and earnings. Instrumental variables estimation is presented in Section 6,

propensity score matching estimation in Section 7, and panel analysis in Section 8. Finally, Section 9 concludes the study and discusses policy recommendations.

2. Background

2.1. Rural electrification in India and South Africa

Rural electrification has been high on agenda for policymakers in both countries over the past several decades. In India, the Rural Electrification Corporation Limited (REC) was formed in 1969 to finance and promote rural electrification projects across India. To this date, several schemes (see table 1) have been undertaken to ensure universal coverage of electricity in the rural areas. In 2005, rural electrification got a renewed focus when it was enshrined in the National Electricity Policy as required by the Electricity Act of 2003. The National Electricity Policy outlines a plan for rural electrification through increased generation capacity, with “maximum emphasis” on hydropower. The flagship scheme is the *Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY)*. Its central aim is to provide continuous power supply in rural India.

In spite of the growing impetus and renewed focus, universal access to electricity in India is still a far cry. According to the 2011 Census, only 55% of rural households have access to electricity.¹ Access to reliable and steady electricity supply is much greater problem for rural households in India. According to the India Human Development Survey (Desai et al., 2007) of all the surveyed rural households, only 6% had a steady 24 hour supply and another 26% had only twelve or fewer hours.

¹ Primary source of lighting is used a proxy for access to electricity.

Table 1: Rural electrification schemes in India (1988-2015)

Schemes	Time period	Features
Kutir Jyoti Program (KJP)	1988-2004	Provided single point light connection (60W) to Below Poverty Line households. Merged with RGGVY in 2005.
Pradhan Mantri Gramodaya Yojna (PMGY)	2000-2005	Provided financial assistance for minimum services (including rural electrification).
Minimum Needs Program (MNP)	2000-2004	Targeted villages with less than 65% rural electrification with 100% loans for last mile connectivity. Merged with RGGVY in 2005.
Accelerated Rural Electrification Program (AREP)	2002-2012	Provided interest subsidy of 4% to states, through approved financial institutions, for rural electrification programs.
Rural Electricity Supply Technology Mission (REST)	2002-	Ensuring electrification of all villages and households through local renewable energy sources and decentralized technologies.
Rajiv Gandhi Grameen Vidyutikaran Yojna (RGGVY)	2005-2014	Targeted 100% rural electrification and electricity access to all households. Replaced by DDUGJY.
Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY)	2014-	To provide continuous power supply to rural India

Source: Compiled by the authors

In South Africa, electrification became a priority after the advent of democracy, as was the case with many other aspects of social policy. As a result, access to electricity for households has increased substantially since the end of apartheid. In 1992, only 35 percent of the population had access to the electricity grid. This access was also extremely unequal, with half of those in urban areas but only 12 percent of those in rural areas having access to electricity. After South Africa's first democratic elections in 1994, the National Electrification Programme (NEP) was established in order to provide electricity access to households that had not had access during apartheid. By 1999, more than 2.5 million households had been electrified, exceeding the NEP target. In 2001, the NEP was transformed into the Integrated National Electrification Programme (INEP), which was implemented and overseen by the Department of Energy (DoE). The main policy change was to focus on rural electrification, as urban

electricity connections had dominated the previous programme (Stats SA, 2013). The DoE mandated that not only the national supplier Eskom (the Electricity Supply Commission of South Africa) but also registered municipalities could receive funding from National Treasury to roll out the national electrification programme (DME, 2001).

Table 2: Electrification programmes in South Africa (1994-2015)

Schemes	Time period	Features
National Electrification Programme (NEP)	1994-2001	Programme aimed to provide electricity access to households that had not had access during apartheid.
Integrated National Electrification Programme (INEP)	2001-2010	Programme focussed on rural electrification, as urban electrification had dominated the previous NEP.
Integrated Resource Plan (IRP)	2010-present	Plan emphasises use of more renewable energy sources, especially in areas that are not grid-accessible.

Source: Compiled by the authors

By 2008, which is the starting point for the empirical analysis in this study, South Africa had achieved an 82 percent household electrification rate. Access to electricity services had been supplied to 89 percent of urban households and 68 percent of rural households. There remained, however, great variation in the electrification rate geographically, with the KwaZulu-Natal (71 percent) Eastern Cape (72 percent) provinces recording the lowest electrification rates (NIDS 2008, author's calculations). To date, South Africa's household electrification progress has been achieved mainly through grid extension. However, in remote rural areas, where the lowest-capacity grid system cannot be supplied within the government's set capital expenditure limit, provision is made for non-grid electrification through solar home systems (DoE, 2009). Furthermore, under the DoE's Integrated Resource Plan (IRP) 2010 for electricity, it is planned that in the future, the use of more renewable energy sources will facilitate further electrification (DoE, 2010).

2.2. The nature of the labour market in India and South Africa

Although both India and South Africa rank at the medium level of human development (UNDP, 2015), the nature of their labour markets is very different. This makes for an interesting comparison of the labour market outcomes for social policy. Key labour market indicators for the two countries are compared in Table 3.² While the share of employment in the secondary sector is approximately twenty percent in both countries, the primary and tertiary sectors vary widely. Despite rapid industrialization, India still has a large agricultural sector with around half of the labour force employed on agricultural lands and farming related activities. The proportion of people employed in the agricultural sector is much more in the rural areas (64 percent) than in urban areas. However, due to increase in technology and improved productivity, employment in the agricultural sector has decreased in the last decade. In contrast, South Africa has largely transformed into a services-dominated economy, away from its past reliance on mining and agriculture. However, employment in the primary sector remains five times more dominant in rural areas than in urban areas.

² The figures presented are based on published statistics for India, and thus we cannot test whether the indicators differ significantly between the rural and urban subsamples.

Table 3: Key labour market indicators, India and South Africa

	India		South Africa	
	Urban	Rural	Urban	Rural
Labor force participation (%)	52.7	60.9	65.0	47.5
Unemployment rate (%)	3.6	1.8	28.3	40.2
Share of employment (%)				
Primary sector	6.7	64.1	4.1	19.1
Secondary sector	35.0	20.4	20.8	19.1
Tertiary sector	58.3	15.5	75.1	61.8
Category of employment (%)				
Self employed ^a	41.9	55.9	12.3	19.0
Wage/ salary earners	43.3	8.7	87.7	81.0
Casual labour	14.8	35.4	-	-
Daily wages (USD)				
Regular wage/salaried employees	7.49	4.98	37.78	18.65
Casual labour ^b	2.84	2.31	-	-
Self-employed	-	-	66.30	29.30

Source: NSSO (2013, published statistics) and QLFS (2013, author's calculations)

Notes: For India, the indicators are based on usual principal and subsidiary status (UPSS). A moving reference period of last twelve months from the date of survey is used to derive the estimates.

For South Africa, the estimates are from the fourth quarter of 2013, and refer to employment activities in the last week. The expanded definition of labour force participation is used, which includes discouraged work seekers among the economically active.

Exchange rates: 1 USD = 60 INR; 1 USD = 10 ZAR in 2013.

a. Self employment includes both farming and non-farming enterprises.

b. Casual labour in works other than public works. This category does not exist in the QLFS data.

India also has a big informal economy. A great percentage of informal workers are employed in the agricultural sector (51 percent). Own-account workers and contributing family workers also form a large part of the informal economy, constituting 64 percent and 17 percent respectively. Post liberalization – in the early 1990s—the share of the private sector boosted growth in the informal sector. The growing informal economy is also manifested in increase in household business of which female business comprise a big part. This has led to increase in the labour force participation of females as self-employed business owners, as is illustrated further in a subsequent table. However, despite the increase in the informal sector it has been seen that lack of adequate electricity supply poses a significant barrier in its growth (Coad and Tamvada, 2012). A high percentage of employed people in the rural areas are self-employed

or casual labour. This is evident from the fact the most people work on their own lands or work as casual labour on other farm lands. On the other hand, because of the large secondary and tertiary sector in the urban areas, a significant proportion of people are wage/salary earners.

The nature of society in general in South Africa, and the labour market in particular, has been heavily influenced by the country's history of legislated and institutionalised discrimination. As a result, there exist very high levels of inequality across a range of dimensions. These dimensions encompass most especially race, but also include geography (especially urban-rural divides) and, to a somewhat lesser extent, gender. The extent and nature of labour force participation, access to employment, and the level of earnings also differ considerably for individuals across these various dimensions. On aggregate, South Africa has experienced rising levels of participation in the labour market, with a gender gap that has narrowed substantially over time (Casale and Posel, 2002; Banerjee et al., 2008). Part of what this research hopes to establish is the extent to which such trends can be attributed to electrification. However, participation in rural areas lags behind that in urban areas by almost twenty percentage points, even when discouraged work-seekers are included in the analysis, as shown in Table 3.

However, as a result of the rise in participation not being met by an increase in job availability, South Africa's unemployment rate increased substantially from 1995 onwards (Banerjee et al., 2008). Unemployment is much higher in rural areas, at more than 40 percent, than in urban areas, at 28 percent. Despite this high and rising unemployment rate, the nature of employment is and has remained highly skewed towards wage employment in the formal

sector,³ with low levels of self-employment. Less than twenty percent of workers were employed in the informal sector by 2014 (Stats SA, 2015).

South Africa is considered to be an international outlier in having such a small informal sector, relative to its high rate of unemployment (Kingdon and Knight, 2007). This may in part be as a result of the ability to rely on the extensive social grant system as means of income support. However, a number of other possible reasons have been suggested for why the informal sector in South Africa is so small, and does not act as a 'sponge' for those who cannot find formal sector employment. High start-up costs, a lack of access to informal credit, high crime rates, and strictly enforced labour regulations have all been suggested as reasons why unemployed individuals do not start small businesses (Kingdon and Knight, 2007; Banerjee et al., 2008). In addition, apartheid spatial planning resulted in poor households living long distances from areas of economic activity. This is especially the case for rural households, where small towns have stagnated while the more distant cities have grown. When coupled with high transport costs, this may prevent individuals from accessing products and markets. Chandra et al. (2002) suggest that lack of access to infrastructure hampers informal sector businesses. While this study was conducted in an urban area, it is likely that such issues are even more pressing in remote rural areas. Access to electricity may thus increase the likelihood of unemployed individuals being able to start small businesses.

In both countries, there are considerable earnings inequalities in favour of urban areas. These are particularly notable in the case of wage/salary earners in both countries, and the self-

³ In most studies on the South African labour market, formal sector employment is defined as individuals who work in enterprises that are registered to pay Value Added Tax. Individuals who work for private households (mainly domestic workers) are considered to fall outside the formal/informal sector classification (Stats SA, 2015).

employed in South Africa. This suggests that the benefits to be gained from employment are lower in rural than in urban areas.

The gender disparities in the labour market are further illustrated in Table 4, which reproduces the labour market statistics above, by gender. Men have large force participation (82 percent) as against women, whose labour force participation is a meagre 33 percent. The low employment rate for women is partly attributed due to a definition where household work is not considered work. Also social norms, gender discrimination and low access to maternity benefits causes many women to stay out of the labour market. The vast majority of women are employed in particular areas, like paid domestic workers. In South Africa, rates of labour force participation are substantially lower among women than among men, although women's participation has risen over time (Casale and Posel, 2002). Women are much more likely than men to be unemployed, and those who find work are typically located in the tertiary sector. For women, similar to the case of India, many of these jobs are as household domestic workers, with relatively low pay.

Among those who find employment, there is a huge disparity in wages across location and gender in both countries, with average wages in urban areas being much higher than in rural areas, as indicated by Table 3. In India, the wages of female salaried employees and casual labour are much lower than their male counterparts, in both rural and urban areas. Similarly, in South Africa, men earn more than women, with the gender disparity being particularly large among the self-employed. It is highly likely that job type and hence earnings are constrained by household circumstances, including lack of access to electricity, thus it may be the case that electrification increases earnings and reduces some of these wage differences. Both countries have a history of electrification programmes that have achieved similar results in

terms of access to electricity. However, the labour market context in which these programmes have been rolled out differs considerably, and thus it remains an open question as to the extent to which increases in labour force participation, employment and earnings can be directly attributed to electrification.

Table 4: Key labour market indicators, India and South Africa (by gender)

	India		South Africa	
	Men	Women	Men	Women
Labor force participation (%)	82.7	33.1	66.4	52.6
Unemployment rate (%)	2.2	2.5	28.8	34.5
Share of employment (%)				
Primary sector	43.6	62.8	10.3	4.0
Secondary sector	25.9	20.0	27.6	11.3
Tertiary sector	30.5	17.2	62.2	84.7
Category of employment (%)				
Self employed	50.7	56.1	15.4	11.9
Wage/ salary earners	19.8	12.7	84.6	88.2
Casual labour	29.4	31.2		
Daily wages (USD)				
Regular wage/salaried employees	6.95	4.98	37.77	30.41
Casual labour ^a	2.80	1.80		
Self-employed			63.59	25.71

Source: NSSO (2013, published statistics) and QLFS (2013, author's calculations)

Notes: For India, the indicators are based on usual principal and subsidiary status (UPSS). A moving reference period of last twelve months from the date of survey is used to derive the estimates.

For South Africa, the estimates are from the fourth quarter of 2013, and refer to employment activities in the last week. The expanded definition of labour force participation is used, which includes discouraged work seekers among the economically active.

Exchange rates: 1 USD = 60 INR; 1 USD = 10 ZAR in 2013.

a. Casual labour in works other than public works. This category does not exist in the QLFS data.

3. Impacts of rural electrification: Literature review

Most studies on the causal link between electricity consumption and GDP at a national level support the “growth hypothesis”, that electricity consumption influences GDP in a positive direction (Khanna and Rao, 2009; Payne, 2010). However, literature is scant in terms of

understanding the causal mechanisms linking electricity supply with income generation, or of the conditions that enable this causal link (Rao, 2013). At the household level, an entire body of literature on rural electrification programmes claims that rural electrification greatly results in the welfare gains of rural households (ADB, 2010; Barnes et al., 2003; IEG, 2008; Khandker, 1996; Martins, 2005). But, most of these studies, as Khandker et al. (2012) points out, rely on correlation between rural electrification and development, without taking into account selection and programme placement biases, and thus have failed to establish a causal and directional relationship. IEG (2008) and Bernard (2012) also uphold the same view that very little “empirical evidence” exists to substantiate the claimed benefits of rural electrification. Although the benefits from rural electrification are self-evident and intuitive, there is limited empirical evidence because the complex chains that link rural electrification to development outcomes confound attempts at attribution (Rao, 2013).

Rural electrification is expected to affect labour market outcomes through three potential channels: first, household electrification frees up women’s time spent in collecting and preparing fuel, and increases the productivity of household tasks through improved technology. It therefore increases labour supply and results in more engagement in market-based work (Dinkelman, 2011; Grogan and Sadanand, 2013; Köhlin et al., 2011; Wu et al., 2010). Second, having access to electricity creates opportunities to generate income within the home and allows for new types of jobs outside the home, thus potentially increasing self-employment and labour demand (Barkat et al., 2002; Chowdhury, 2010; Walle et al., 2013). Women are likely to be the key beneficiaries of any such changes, and thus rural electrification has the potential to empower women. Third, a shift from agricultural to non-agricultural activities that is associated with increase in productivity and thus, increases in income

(Torero, 2015). This is particularly relevant to India, which is a predominantly agricultural economy. Access to electrification is likely to help gain access to productive appliances and thus lead to firm creation and firm development at home and outside.

In terms of labour market outcomes, quantitative empirical research has been growing, although with mixed results. Using data from India, Khandker et al. (2012) estimate impacts of the order of 25-50% on income due to rural electrification. ESMAP (2003) finds that productivity-related increases in income have been linked to improved lighting in Philippines. In this case, the positive impact on income is due to return on education, through the effect of improved lighting. A study by Bensch et al. (2011) shows that income differences between households with and without access to an electrification programme in Rwanda becomes statistically insignificant when the comparison takes selection bias and regional differences into account.

Increases in labour force participation because of household electrification have figured prominently in the debate around the benefits due to household electrification. Recent studies by Dinkelman (2011) and Grogan and Sadanand (2013) find positive effects on female employment due to electrification in South Africa and Nicaragua, respectively. Dinkelman (2011) estimates that rural female employment increased by 9-9.5 percentage points in South Africa in the 1990s due to rural electrification and Grogan and Sadanand (2013) find that probability of women working outside the home increased by 23% in Nicaragua as a result of rural electrification. Dinkelman (2011) attributes the increase in labour supply to the use of electric stoves and other time saving appliances. A recent study by Walle et al. (2013) finds some impact on labour supply and wage rates in India based on an old panel survey.

According to another line of inquiry, household electrification may also extend the number of productive hours due to increased use of lighting. These extra hours can be used for income generating activities at home like sewing, embroidery etc. Studies by Barkat et al. (2002) and Chowdhury (2010) show that due to increased lighting, women in Bangladesh use a greater share of their time in doing household work that result in generating extra income.

Most studies have attempted to evaluate the impacts of rural electrification using quasi-experimental methods. Instrumental variable approaches have been fairly common to evaluate electrification impacts. Dinkleman (2011) and Lipscomb et al. (2013) uses exogenous programme placement instruments to identify the impacts. Grogan and Sadanand (2013) and Khandekar (2012) use instrumental variables to ascertain the impacts on income generation in Nicaragua and Bangladesh respectively. Walle et al. (2013) and Khandker (2013) uses panel data approaches to evaluate the impacts in India and Vietnam respectively.

In spite of these recent efforts evidence of impacts of rural electrification on labour supply and wages still remains weak. In general, besides being inconclusive, the case- and region-specific nature of these studies makes it difficult to generalize to other developing country contexts. In light of this, we employ a cross-country comparative study using multiple identification strategies and recent data to ascertain the causal impacts of rural electrification on labour market outcomes – particularly on those of women.

4. Research methods

The extent to which rural electrification improves labour market outcomes depends on the labour absorption capacity of the economy, and the willingness and ability of rural inhabitants

to engage in income earning activities. It is thus very difficult to generalise about the effectiveness of any particular rural electrification programme. Since the labour markets of India and South Africa differ quite substantially, the outcomes of rural electrification may also differ. We use three key identification strategies in order to assess the causal effect of rural electrification in the two countries.

We examine various labour market outcomes including labour force participation, employment and number of hours worked and earnings. In each case, the variable of interest is the electrification status of the household. However, electrification may not be randomised. It may suffer from reverse causality if households with better labour market outcomes are more able to demand electrification, and hence a simple regression model may give biased estimates. In addition, if rural electrification is more cost-effective in areas that already have unmeasured economic advantages, which is correlated with labour market outcomes, then household electrification status may suffer from omitted variable bias. Rural electrification may also be driven by political economy rather than customer demand or the cost-effectiveness of grid expansion. Political economy may also explain the location and timing of other types of public interventions, such as subsidies and industrial parks, which are likely to directly affect labour market indicators. Household electrification status may thus be endogenous to labour market outcomes via the unmeasured political economy motivations.

To overcome this potential problem of endogeneity bias we use an instrumental variables (IV) approach to arrive at unbiased estimates of labour market outcomes due to electrification. Equations (1) and (2) show the proposed 2-stage IV regression model.

$$Y_i = \theta S_i + \beta X_i' + \varepsilon_i \quad (1)$$

$$S_i = \pi Z_i + \delta X_i' + \mu_i \quad (2)$$

Y_i is the outcome of interest (employment status, earnings or hours worked), S_i is electricity access, X_i' is the vector of covariates, Z_i is the instrument and ε_i and μ_i are the random error terms. This model will thus estimate the causal effect of the household's electrification status on labour market outcomes for household members.

For the estimation of earnings and hours worked, the equations are also estimated using a Heckman selection model to account for selection into employment. The inverse Mills ratio for the employment probability, lambda, is included in the IV model, using household characteristics such as assets, total consumption and home ownership as exclusion restrictions. These characteristics affect both the household's level of need for income from paid employment and the extent of constraints on job search or the ability to start a business. However, they are not expected to have an independent effect on the wage earned if the individual finds a job, after controlling for their other observable personal and job characteristics. The model thus estimates the causal effect of the household's electrification status on labour market outcomes, after controlling for non-random selection into employment. Equations 3 and 4 show the 2-step Heckman selection procedure.

$$\text{Regression equation: } y_i = x_i\beta + \varepsilon_i, \text{ observed when } w_i = 1 \quad (3)$$

$$\text{Selection equation: } w_i^* = z_i\gamma + u_i, w_i = 1 \text{ if } w_i^* > 0 \text{ and } w_i^* < 0 \text{ otherwise} \quad (4)$$

$$\Pr(w_i = 1|z_i) = \Phi(z_i\gamma)$$

and

$$\Pr(w_i = 0|z_i) = 1 - \Phi(z_i\gamma)$$

x_i is a vector of exogenous variables determining outcome y_i , and w_i^* is a latent endogenous variable. If w_i^* is greater than the threshold value then the observed dummy variable $w_i = 1$, and otherwise $w_i = 0$; the regression equation observes value y_i only for $w_i = 1$; z_i is a vector of exogenous variables determining the selection process; $\Phi(\cdot)$ is the standard normal cumulative distribution function; and ε_i and u_i are error terms.

For the instrument to explain the electrification penetration or demand for electrification of a household, we use the proportion of households in a district/village that are electrified as an instrument. This instrument has been used by Khandker et al. (2012) and Rao (2013) to estimate the impacts of electricity on various welfare outcomes. The underlying principle is that peer effects influence households' uptake of electricity once a village (or area) is provided with electricity access. The influence of social networks and peer effect has, more generally, been demonstrated in other areas such as in education (e.g. Akerlof and Kranton, 2002) and technology adoption (e.g. Bandiera and Rasul, 2006). In a recent study, Bernard and Torero (2014) show using a randomized control trial that the electrification status of a household's neighbours affects their own decision to connect to the electricity grid. However, they find that this effect declines with the distance between the household and their neighbours.

However, it is possible that electrification at the local level may impact on labour market outcomes through general equilibrium effects. If this is the case, then the rate of local electrification fails the exogeneity requirement to act as an instrument. The paper therefore also uses two additional strategies in order to assess the robustness of the causal relationship between electrification and labour market outcomes. In the first alternative strategy, propensity score matching (PSM) is used to attempt to reduce the bias in the treatment effects arising out of the confounding variables, due to lack of a selection rule for randomizing

households into treatment and control groups. PSM mimics randomization by creating a sample of households that were electrified that is comparable on observed covariates to a sample of households that were not electrified.

The final identification strategy used in the paper is panel analysis. The India data can be matched into a two-wave panel, with data collected in 2005 and 2011/12. The South Africa data can be matched into a three-wave panel, with data collected in 2008, 2010/11 and 2012.⁴ By comparing the labour market outcomes of the same individuals over time, we are able to control for time-invariant unobserved heterogeneity that may be correlated with both household access to electricity and labour market success. We therefore estimate the impact of electrification on employment status, earnings and hours worked using fixed effects (FE) and random effects (RE) estimation, as a final means of identifying the causal effect of electrification. Equations (5) and (6) show the panel estimation using fixed effect and random effects models respectively.

$$Y_{it} = \beta_1 X'_{it} + \alpha_i + u_{it} \quad (5)$$

Y_{it} is the outcome of interest where for individual i in time t , X'_{it} is a vector of covariates, β_1 is the coefficient of a covariate, α_i is the unknown intercept of each individual and u_{it} is the error term.

$$Y_{it} = \beta_1 X'_{it} + \alpha + u_{it} + \varepsilon_{it} \quad (6)$$

Y_{it} is the outcome of interest where for individual i in time t , X'_{it} is a vector of covariates, β_1 is the coefficient of a covariate, α is the unknown intercept, u_{it} is the between-individual

⁴ A fourth wave of the NIDS data has recently been released to the public, but was not yet available at the time that the analysis in this paper was conducted.

error and ε_{it} within-individual error. In general, FE estimation is consistent in the presence of time-invariant unobserved heterogeneity that is correlated with the observed variables, but RE is more efficient provided that such correlations do not exist. We use both estimators, and conduct Hausman tests to determine the most appropriate method for each country and labour market indicator.

5. Data and descriptive statistics

The first parts of the empirical analysis are conducted using cross-sectional data. This allows for the presentation of a snapshot of the differences between electrified and non-electrified households. The final empirical section then adds a time dimension to the analysis, through the use of panel data.

For the India analysis, we primarily use the 2005 India Human Development Survey (IHDS). The IHDS is a nationally representative sample of 41,554 households sampled from 33 states and union territories, 383 districts, 1,503 villages, and 971 urban blocks. The survey covers several topics related to health, energy use, infrastructure, income, expenditure, education, and others. In addition to information regarding access to electricity, the survey asks households to estimate the average hours of electricity supply in the previous month. A second round of IHDS re-interviewed the first-round households in 2011/12 to examine changes in an era of rapid economic growth. This later wave of data is used in the panel analysis in Section 8.

The cross-sectional analysis for South Africa will use data from the 2008 National Income Dynamics Study (NIDS), which is South Africa's first national panel survey that tracks

individuals.⁵ The survey is conducted by the Southern Africa Labour and Development Research Unit (SALDRU) based at the University of Cape Town. NIDS is a nationally representative sample of 28,255 individuals in 7,305 households. The data were collected through a stratified, two-stage cluster sample design. Stats SA's master sample was used to select 400 primary sampling units (PSU). Two clusters of dwelling units, not previously used for other Stats SA surveys, were selected from each PSU (Leibbrandt et al., 2009). The survey covers topics related to the livelihoods of individuals and households, including labour market participation and economic activity, education, health and migration. Subsequent waves of data were collected in 2010/11 and 2012, which will be used for the later panel analysis.⁶ We use the survey's post-stratification weights to correct our analysis for household non-response and to adjust the sample to the population distribution based on age, sex and race (Leibbrandt et al., 2009).

The cross-sectional sample is restricted to individuals aged 15 and older living in households located in rural areas throughout the analysis. This results in a dataset consisting of 74,464 individuals in India and 7,666 individuals in South Africa. The substantially smaller sample size for the latter dataset is likely to result in lower precision of the estimated effect of electrification. This issue is discussed further in Section 6. In both datasets, electrification can be identified at the household level.

Table 5 below shows summary statistics on the labour market variables for each country for the male and female subsamples, by the household's electrification status. In India, 65

⁵ Individuals are located in subsequent waves, even if they change households or geographical location, through the collection of a variety of contact detail information for both the individual and their three closest contacts. The extent of attrition is discussed in Section 9.

⁶ A fourth wave has recently been made available, but had not yet been released to the public at the time that this analysis was conducted.

percent of rural women and men live in households that are electrified, while 69 percent of rural South African women and 71 percent of men live in electrified households. The India dataset uses a threshold of 240 hours per year for distinguishing employment status, rather than the complete absence of work. It also does not distinguish the economically inactive from the unemployed, and therefore it is not possible to assess participation in the labour force. Although the South Africa dataset does make these distinctions, for the sake of consistency and comparability, the 240 hours per year threshold has been used in both cases in the comparative models section. In India, individuals living in households with electricity are less likely to work for at least 240 hours in a year compared to households without electricity, whereas the opposite is true in South Africa. Amongst those who report any form of labour market earnings,⁷ rates of self-employment are very low in rural India, where agricultural wage employment is the dominant form of work. Access to electricity is associated with significantly lower rates of working in a household business for men and significantly higher rates for women, but the magnitudes are very small. Self-employment is more common amongst working South Africans, but only men are significantly more likely to be self-employed if they have access to electricity.

Annual earnings among the employed are significantly higher for individuals living in households with access to electricity, in both countries. Both men and women living in households with access to electricity also work longer hours, by a margin of more than 200 hours in a year in India and approximately 400 hours in a year in South Africa. The study seeks

⁷ The earnings variable includes both wage employed and self-employed workers. For the self-employed, earnings consist of total household business income per person working in the business (for India) or business income that is kept by the individual after expenses (South Africa). For South Africa, a small proportion of individuals who are employed report zero earnings. They have been assigned a nominal value of one Rand before the earnings value was converted into a logarithm, in order to retain them in the sample of the employed.

to determine whether these differences in labour market outcomes can be linked causally to the household's electrification status.

Table 5. Summary statistics on labour market variables (ages 15 and older in rural areas), by gender and household access to electricity

	Women				Men			
	India		South Africa		India		South Africa	
	No electricity	Electricity	No electricity	Electricity	No electricity	Electricity	No electricity	Electricity
Proportion of individuals	0.348 (0.0114)	0.652*** (0.0114)	0.313 (0.0356)	0.687*** (0.0356)	0.349 (0.0117)	0.652*** (0.0117)	0.296 (0.0388)	0.705*** (0.0388)
Employment status								
Employed at least 240 hours per year	0.584 (0.0101)	0.525*** (0.00742)	0.242 (0.0190)	0.273 (0.0180)	0.827 (0.00608)	0.775*** (0.00569)	0.354 (0.0344)	0.441+ (0.0327)
<i>Sample size (all adults)</i>	9832	29614	1692	2995	9963	30055	992	1987
Employment characteristics								
Self-employed ^a	0.014 (0.0024)	0.019* (0.0028)	0.186 (0.0405)	0.167 (0.0210)	0.039 (0.0037)	0.028*** (0.0022)	0.0893 (0.0252)	0.126* (0.0202)
Log of annual earnings (local currency)	8.177 (0.0306)	8.453*** (0.0250)	7.575 (0.245)	8.435* (0.283)	9.018 (0.0237)	9.463*** (0.0239)	8.688 (0.217)	9.360* (0.181)
Log of hourly earnings (local currency)	1.458 (0.0195)	1.518* (0.0183)	0.808 (0.183)	1.362+ (0.228)	1.862 (0.0129)	2.154*** (0.0168)	1.664 (0.214)	2.010 (0.156)
Hours worked per year	1027.2 (21.38)	1235.0*** (20.75)	1270.1 (81.67)	1604.6** (97.59)	1497.9 (20.62)	1731.0*** (16.03)	1556.4 (132.1)	2020.0** (91.57)
<i>Sample size (employed adults)</i>	3508	6378	439	797	7444	14583	344	788

Source: IHDS 2005 and NIDS 2008, authors' calculations

Notes: Standard errors in parentheses

Estimates are weighted to population levels

+ p<.10, * p<.05, ** p<.01, *** p<.001 indicates that the mean differs between individuals in electrified and non-electrified households

a. Self employment does not include working on farming activities. The outcome of interest here is the any generation of self employment due to electrification. Hence, non-farm activities (or home businesses) are potential outcomes of electrification.

Table 6 illustrates the demographic and household characteristics that will be used as control variables in the models. In both countries, individuals in households with electricity have completed approximately two more years of education, live in households with a greater number of adults and fewer children, more assets and higher average consumption expenditure compared to their counterparts in households without electricity. These summary statistics suggest that individuals living in electrified households have better productive characteristics than those in non-electrified households, which might result in better labour market outcomes. However, their households are also economically better off, which may reduce the need to work.

The instrument for the household's electrification status is the percentage of households in the local area who have access to electricity. In the India dataset, this information was collected directly at the village level. In the South Africa dataset, this measure was constructed using the geographical location of households, by aggregating the electrification status of individual households within the household cluster.⁸ On average, the percentage of households in the local area that have electricity is approximately twenty five percentage points higher for individuals living in households that are themselves electrified, compared to those in households that are not electrified, in both countries and for both genders. The correlation between these two measures of electricity access is 0.52 for both males and females for the India sample, but only 0.40 for males and 0.41 for females for the South Africa sample. This suggests that electricity access at the local level is a weaker instrument for household electrification status in South Africa than it is in India. However, it is not low

⁸ There are 400 such clusters in total, containing an average of 18 households each. In Section 7, robustness checks are presented in which the instrument in the Indian data is measured in a similar manner to the South African instrument.

enough to flag as a problem at this stage. This issue is elaborated on in the IV section that follows.

Table 6. Summary statistics on control variables (ages 15 and older in rural areas), by gender and household access to electricity

	Women				Men			
	India		South Africa		India		South Africa	
	No electricity	Electricity	No electricity	Electricity	No electricity	Electricity	No electricity	Electricity
Individual characteristics								
Age	36.00 (0.204)	36.97*** (0.139)	44.00 (0.748)	42.79+ (0.510)	36.73 (0.210)	37.30** (0.145)	41.29 (0.787)	40.68 (0.672)
<i>Marital status</i>								
Married	0.726 (0.00720)	0.711*** (0.00404)	0.307 (0.0195)	0.345 (0.0207)	0.683 (0.00716)	0.678+ (0.00440)	0.304 (0.0242)	0.382+ (0.0289)
Single	0.147 (0.00641)	0.164*** (0.00365)	0.356 (0.0247)	0.407+ (0.0232)	0.266 (0.00691)	0.283** (0.00449)	0.535 (0.0353)	0.488 (0.0302)
Widowed	0.112 (0.00447)	0.114 (0.00264)	0.209 (0.0158)	0.147*** (0.0112)	0.0429 (0.00327)	0.0331* (0.00162)	0.0195 (0.00597)	0.0329 (0.00710)
Separated/divorced	0.00949 (0.00143)	0.00758 (0.000861)	0.0180 (0.00447)	0.0284 (0.00530)	0.00487 (0.000845)	0.00302 (0.000472)	0.0205 (0.00749)	0.0243 (0.00580)
Other marital status	0.00564 (0.00167)	0.00325 (0.000780)	0.110 (0.0206)	0.0719 (0.00894)	0.00326 (0.000710)	0.00306 (0.000788)	0.122 (0.0247)	0.0733+ (0.0105)
Years of education	1.786 (0.0703)	3.901*** (0.0714)	5.618 (0.223)	7.176*** (0.190)	4.079 (0.107)	6.575*** (0.0796)	5.488 (0.281)	7.669*** (0.238)
No. of children (0-14)	2.283 (0.0601)	1.891*** (0.0388)	2.249 (0.154)	2.069 (0.117)	2.157 (0.0580)	1.778*** (0.0374)	1.508 (0.198)	1.538 (0.145)

	Women				Men			
	India		South Africa		India		South Africa	
	No electricity	Electricity	No electricity	Electricity	No electricity	Electricity	No electricity	Electricity
No. of teens (15-21)	1.003 (0.0276)	1.007 (0.0186)	0.764 (0.0565)	0.841 (0.0848)	1.058 (0.0300)	1.050 (0.0186)	0.627 (0.0841)	0.742 (0.105)
No. of adults (22+)	2.940 (0.0428)	3.419*** (0.0344)	2.488 (0.0817)	2.817 (0.174)	3.052 (0.0449)	3.499*** (0.0355)	2.613 (0.129)	3.063 (0.220)
Household characteristics								
No. of household assets	5.748 (0.0830)	11.96*** (0.109)	3.623 (0.189)	7.474*** (0.304)	5.798 (0.0828)	12.00*** (0.109)	3.538 (0.224)	7.766*** (0.389)
Highest education of adult in household (years)	4.594 (0.133)	7.789*** (0.0947)	8.018 (0.226)	9.648*** (0.173)	4.931 (0.139)	7.998*** (0.0972)	7.723 (0.293)	9.876*** (0.229)
Log of household consumption	6.096 (0.0141)	6.464*** (0.0132)	9.552 (0.0491)	10.05*** (0.0688)	6.101 (0.0136)	6.480*** (0.0132)	9.484 (0.0640)	10.15*** (0.0952)
House is owned	0.985 (0.00214)	0.976*** (0.00266)	0.910 (0.0175)	0.877 (0.0217)	0.987 (0.00209)	0.978*** (0.00246)	0.844 (0.0274)	0.831 (0.0278)
Percentage of households in local area that have electricity access	48.96 (1.644)	74.98*** (1.067)	61.97 (5.881)	90.00*** (1.103)	48.68 (1.674)	75.24*** (1.046)	64.18 (6.504)	89.67*** (1.228)
<i>Sample size (all adults)</i>	9832	29614	1692	2995	9963	30055	992	1987

Source: IHDS 2005 and NIDS 2008, authors' calculations

Notes: Standard errors in parentheses

Estimates are weighted to population levels

+ p<.10, * p<.05, ** p<.01, *** p<.001 indicates that the mean differs between individuals in electrified and non-electrified households

6. Instrumental variables estimation

The tables below present estimates for the effect of household electrification status on labour market outcomes both without and with the use of the instrument for electrification status. Three labour market outcomes are examined: whether the individual works (for at least 240 hours in a year), the log of annual earnings, and the log of annual hours worked. For employment, a probit model is estimated, both without and with instrumentation for the endogeneity of electrification status. For earnings and hours worked, four models are estimated: (1) a basic Ordinary Least Squares (OLS) model, (2) a Heckman model accounting for selection into employment, where the selection equation is identical to the employment probit, (3) a two-stage least squares model, with the percentage of households in the local area that have access to electricity as the instrument for household electrification status, and (4) a Heckman model with instrumentation for endogeneity.

Identification restrictions

The Heckman model is used to control for selection into employment. Since the selection equation is identical to the employment probit, the identification restrictions are the household-level economic status variables that are assumed to affect the individual's likelihood of being employed. These variables are the number of assets owned by the household, the household's total consumption, the highest education of an adult in household, and whether the household owns its dwelling. They may affect employment status through two channels: better household-level economic status may decrease the need for individual members to seek employment, or may decrease the constraints that members face to search for work or start a business. Among those who find employment, the household's economic status is assumed not to affect the individual's level of earnings, after

controlling for their other observable personal and job characteristics. In both India and South Africa, and for both genders, we found that there is significant selection into employment.

Instrument validity

The first stage model to estimate the instrument for household electrification status, for the employment probit, is presented in full in for each country in Appendix Table A1. Similar models were estimated for the other outcomes, on the sample of employed individuals. We conducted the Durbin-Wu-Hausman test for whether access to household electrification is endogenous. In both India and South Africa, and for all three of the outcome variables, we found that access to household electrification is endogenous.

Weak instrument test

The correlation presented in Section 5 suggested that electricity access at the local level is a weaker instrument for household electrification status in South Africa than it is in India. We further conducted formal tests to assess the strength of the instrument. The very high and robust F-statistics from the first-stage regression for India (7093.73 for men and 2807.8 for women) confirm that the instrument is not weak. For South Africa the F-statistic is 27.61 for men and 43.99 for women, suggesting again that the instrument is not weak, although it is not as strong as for India.

Findings

Tables 7 and 8 below summarise the findings from the regression models using a common set of identically-defined covariates across the two countries.⁹ First, in Table 7, the models are

⁹ Only the coefficient of interest, on household access to electricity, from each model is reported here. The full sets of estimates for all of the models for each country are presented in Appendix A, in order to show the

estimated for the full sample for each country, with a gender dummy as a covariate. For India, individuals living in households with electricity are significantly more likely to work at least 240 hours per year than those without electricity. Annual earnings and hours worked are also higher for this group, although the magnitude and significance of the effect of electricity varies across estimation technique.¹⁰ For South Africa, household access to electricity does not significantly affect any of the three labour market outcomes, either with or without instrumentation.

Table 7. Summary of the effect of access to electricity on labour market outcomes

	India	South Africa
Employment (for at least 240 hours per year)		
Probit (marginal effect)	0.0372*** (0.00755)	-0.0201 (0.0355)
IV Probit (marginal effect)	0.330*** (0.0995)	-0.308 (0.212)
Log of annual earnings		
OLS	0.0961*** (0.0164)	0.183 (0.146)
Heckman	0.0335+ (0.0190)	-0.0882 (0.133)
IV-2SLS	0.0925* (0.0439)	0.376 (0.424)
Heckman IV-2SLS	0.00377 (0.0446)	-0.102 (0.308)
Log of hours worked per year		
OLS	0.000891 (0.0225)	0.0709 (0.0845)
Heckman	0.00163 (0.0225)	0.0557 (0.0503)
IV-2SLS	0.291*** (0.0786)	-0.240 (0.220)
Heckman IV-2SLS	0.318*** (0.0825)	-0.0847 (0.145)

Source: IHDS 2005 and NIDS 2008, authors' calculations

Notes: Standard errors in parentheses. Estimates are weighted to population levels. + p<.10, * p<.05, ** p<.01, *** p<.001. All models include a complete set of control variables similar to those shown in the table of descriptive statistics. The full results for the first employment equation are displayed in Appendix

covariates. The employment models displayed there also serves as the selection equations for the Heckman wage and hours worked equations.

¹⁰ The specifics of the estimation methods are discussed further below.

Table A1.

However, the gender dummy (not shown here) is significant across most models, with men typically being more likely to be employed, earning higher wages, and working longer hours than women in both countries. It is therefore likely that the models estimated above for the full sample fail to account for many other gendered labour market differences, including perhaps the effect of electrification. The remainder of the paper therefore disaggregates all models by gender. The findings of these models are considered to be a better reflection of labour market experiences in the two countries, and thus they are discussed in more detail than the table above.

Table 8 presents the gender-specific models. For India, household access to electricity has a significant positive effect on employment probability and working hours, but not earnings, for women. Therefore, it appears that the transmission mechanism for women is that gaining access to electricity increases the amount of time that women have available to engage in paid employment.¹¹ In the IV specifications, access to electricity increases women's hours of work by more than 0.6 log points. However, after controlling for the number of hours that they work, access to electricity does not increase their earnings. It has a significant positive effect on earnings for men, of approximately ten log points, and on hours worked in some specifications. Therefore, for men, electricity may have some marginal benefit for the number of hours available to work, but its primary effect is to raise earnings, perhaps by improving men's productivity. For both employment status and earnings, the results are robust to both

¹¹ An analysis of paid employment only is likely to significantly undercount the work that women do. For example, many women may be non-remunerated family workers. If they report the characteristics of their work, but not a wage, then they are nonetheless included in the estimated models by assigning them a nominal wage of one Rupee or Rand. However, neither of the datasets collect information on time spent on household duties such as cooking and childcare, and thus it is not possible to account for such activities.

the instrumentation of electricity access and the selection into employment. Instrumentation typically increases the magnitude of the effect of electricity access on labour market outcomes, suggesting that failing to account for the endogeneity of electrification underestimates its benefits, especially for women. However, the magnitude of the increase in the effect of electrification that results from instrumentation, of the order of a tenfold increase in some estimations, may be implausible. This suggests that the results may be very sensitive to the use of the instrument. Although IV effects that are larger than OLS estimates are common in economics, it is possible here that measurement error may play a role, or that the instrument might be picking up otherwise-omitted village-level effects. We conduct some robustness checks on the instrument in the next section.

Table 8. Summary of the effect of access to electricity on labour market outcomes, by gender

	India		South Africa	
	Male	Female	Male	Female
Employment (for at least 240 hours per year)				
Probit (marginal effect)	0.00660 (0.00468)	0.0758*** (0.0131)	0.0333 (0.0437)	-0.0612 (0.0386)
IV Probit (marginal effect)	-0.176 (0.120)	0.669*** (0.123)	-0.321 (0.326)	-0.347 (0.226)
Log of annual earnings				
OLS	0.135*** (0.0167)	0.00776 (0.0237)	-0.00524 (0.163)	0.372* (0.180)
Heckman	0.0986*** (0.0182)	-0.0697* (0.0294)	-0.308* (0.150)	0.116 (0.132)
IV-2SLS	0.145** (0.0452)	-0.0324 (0.0630)	0.461 (0.449)	0.206 (0.452)
Heckman IV-2SLS	0.0890+ (0.0456)	-0.145* (0.0639)	-0.239 (0.326)	-0.0619 (0.304)
Log of hours worked per year				
OLS	-0.0390+ (0.0229)	0.0894** (0.0335)	0.123 (0.117)	0.00515 (0.103)
Heckman	-0.0388+ (0.0229)	0.0917** (0.0335)	-0.0119 (0.0586)	0.0934 (0.0761)
IV-2SLS	0.152* (0.0771)	0.619*** (0.118)	-0.568+ (0.324)	0.0125 (0.220)
Heckman IV-2SLS	0.163* (0.0798)	0.695*** (0.122)	-0.323+ (0.186)	0.0136 (0.175)

Source: IHDS 2005 and NIDS 2008, authors' calculations

Notes: Standard errors in parentheses. Estimates are weighted to population levels. + p<.10, * p<.05, ** p<.01, *** p<.001. All models include a complete set of control variables.

For South Africa, household access to electricity has few significant effects for either gender, as shown in the final two columns of Table 8 above. It is possible that this insignificant finding is a result of the small sample size of the NIDS data, a possibility which is explored further below. For women, electricity access decreases the probability of being employed, but not significantly so. Having access to electricity raises earnings in three of the four models, but does so significantly only in the most basic OLS model specification, and only at the five percent level. Finally, household electrification increases hours worked amongst the employed consistently across all model specifications, but the effect is not large enough to be

statistically significant. For men, the results are even more mixed. For all three of the economic outcomes, the direction of the effect of electrification varies across the estimation methods. The only statistically significant effect is for one of the four earnings models, where electricity decreases earnings at a five percent level, and two of the hours worked models, where access to electricity decreases hours worked at a ten percent level. Controlling for selection into employment typically decreases the magnitude of the effect of electrification on labour market outcomes.¹² Instrumentation does not consistently affect the magnitude of the effect of electricity access on labour market outcomes.

Robustness checks

The descriptive statistics presented in Table 6 suggest that the characteristics of individuals in electrified and non-electrified households are quite similar between the two countries. Why, then, are the regression findings so different? There are several possible explanations. First, there are two potential data-related explanations. The sizes of the datasets are quite different: the employment probit model was estimated for a sample of 93,697 individuals for India, but only 5,663 individuals for South Africa. The number of observations in the South African data may be too small to estimate the effect of household electrification precisely enough for the results to be statistically significant, especially if the effect is quantitatively quite small. A second potential data-related explanation is that the instrument for electrification is also defined differently. In the Indian data, the percentage of households with access to electricity is reported directly by the village head in the village questionnaire. In the South African data, the percentage of households with access to electricity was

¹² There is negative selection into employment, which is a common finding in the South African labour market literature. See, for example, Borat and Leibbrandt (2001).

estimated at the household cluster level. Reporting differences may therefore impact on the findings, especially since there is a lower correlation between the electrification of individual households and the local area in the South African data than in the Indian data.

These potential data explanations are investigated further through two robustness checks on the Indian data, as displayed in Table 9 below. The first two columns of estimates are reproduced from Table 8 above, for comparison purposes. The next two columns present the results estimated on a random sample of similar size to the South African data. As expected, the main effect of the smaller sample size is to decrease the statistical significance of the results. Of the twenty models (ten for each gender), the level of significance of the electrification status decreases in four cases and is lost completely in ten other cases. However, the direction of the effect of electrification changes in only four cases, all of which have very small estimated coefficients. This suggests that the lack of statistically significant findings for South Africa may indeed be as a result of the small sample size. For outcomes which display a consistent sign across multiple estimation methods, there may be some economic significance to the effect of electrification, even if the estimation is not sufficiently precise to produce statistically significant results.

Table 9. Robustness checks on the effect of access to electricity on labour market outcomes for India, by gender

	Original results		Sample size comparable to SA data		Instrument defined as in SA data	
	Male	Female	Male	Female	Male	Female
Employment (at least 240 hours per year)						
Probit	0.00660	0.0758** *	-0.0106	0.0809*	0.00660	0.0758** *
	(0.00468)	(0.0131)	(0.0197)	(0.0318)	(0.00468)	(0.0131)
IV Probit	-0.176	0.669***	0.177	0.887***	-0.1000	0.374***
	(0.120)	(0.123)	(0.476)	(0.247)	(0.0742)	(0.0746)
Log of annual earnings						
OLS	0.135***	0.00776	0.0800+	0.0118	0.135***	0.00776
	(0.0167)	(0.0237)	(0.0432)	(0.0483)	(0.0167)	(0.0237)
Heckman	0.0986** *	-0.0697*	-0.000059	-0.116*	0.0986** *	-0.0697*
	(0.0182)	(0.0294)	(0.0463)	(0.0534)	(0.0182)	(0.0294)
IV-2SLS	0.145**	-0.0324	0.104	0.0355	0.204***	0.0198
	(0.0452)	(0.0630)	(0.106)	(0.106)	(0.0334)	(0.0445)
Heckman IV-2SLS	0.0890+	-0.145*	0.0153	-0.0939	0.162***	-0.0792
	(0.0456)	(0.0639)	(0.103)	(0.119)	(0.0351)	(0.0495)
Log of hours worked per year						
OLS	-0.0390+	0.0894**	-0.0264	0.0497	-0.0390+	0.0894**
	(0.0229)	(0.0335)	(0.0595)	(0.0792)	(0.0229)	(0.0335)
Heckman	-0.0388+	0.0917**	-0.0255	0.0482	-0.0388+	0.0917**
	(0.0229)	(0.0335)	(0.0595)	(0.0784)	(0.0229)	(0.0335)
IV-2SLS	0.152*	0.619***	0.135	0.515**	0.160**	0.397***
	(0.0771)	(0.118)	(0.188)	(0.199)	(0.0490)	(0.0692)
Heckman IV-2SLS	0.163*	0.695***	0.201	0.634**	0.168***	0.424***
	(0.0798)	(0.122)	(0.204)	(0.241)	(0.0496)	(0.0725)

Source: IHDS 2005, authors' calculations

Notes: Standard errors in parentheses. Estimates are weighted to population levels. + p<.10, * p<.05, ** p<.01, *** p<.001. All models include a complete set of control variables.

The last two columns of Table 9 present a further robustness check, in which the results estimated on the full sample, but with the electrification instrument defined similarly to in the South African data.¹³ This change affects only the IV model estimations. In comparison to

¹³ Here, the percentage of households with access to electricity in India was estimated at the village level. There are 1483 villages located in rural areas, containing an average of 16 households each. The correlation between

the original results, the findings here typically become somewhat stronger for males, but weaker for females, but with few substantial changes in significance levels. The magnitude of the effect of electrification for India with and without instrumentation is less volatile than was the case in the initial estimates, suggesting that the constructed instrument may be somewhat less susceptible to measurement error than the reported village electrification rate. Nonetheless, it therefore seems unlikely that differences in the construction of the instrument can entirely explain the differences in findings between the two countries.

A second potential explanation for the difference in regression findings between the two countries lies with the nature of the labour market in South Africa, such that the potential benefits of electrification may not be fully realised. In particular, individuals having more time available to search for or engage in paid employment as a result of electrification may not translate into increases in employment if vacant jobs are not available. Amongst the employed, electrification may not change hours worked or earnings if most individuals work for employers who allow little flexibility on such attributes. Given that South Africa has a very high rate of unemployment, and a rigid labour market with low rates of self-employment relative to most African countries, the potential benefits of electrification may not translate into improved labour market outcomes. Further non-parametric and econometric estimation, as presented in Sections 7 and 8, may be able to disentangle such effects.

the instrument as reported by the village head and the instrument estimated here is 0.74 for females and 0.73 for males.

7. Propensity score matching estimation

A multivariate regression analysis depends on the functional form of the covariates to arrive at a relationship between outcomes and explanatory variables. When there is not much overlap between the covariates across groups, the results from the regression may be implausible (Foster, 2003). In our case, the covariates have differing means between those groups that have electricity and those that do not. We therefore employ propensity score matching to eliminate any risk of implausibility in the comparisons. Propensity score matching does not rely on any functional form, and matches treated and untreated observations on the estimated probability of being treated (propensity score). The matched observations fall under a region of “common support” where the observations based on certain characteristics have a positive probability of being in either the treatment or control group.

We use propensity score matching to compare individuals in households which had electricity to individuals in households which did not have access to electricity. We use three matching algorithms (nearest neighbour, kernel and radius) to match the treated individuals (with electricity) to the untreated individuals (without electricity). To generate the propensity scores, we use similar set of covariates (age, gender, education, marital status and social group) for India and South Africa. The choice of covariates should be such that they do not influence the treatment (access to electricity). The idea is to have the two groups (control and treatment) as similar as possible based on the propensity to receive any potential treatment. The process followed the following steps. First, propensity scores were calculated using a probit model and chosen covariates. Second, on the basis of the propensity scores, individuals in electrified households were matched with the ones in control groups using three matching algorithms: nearest neighbour, kernel and radius. Finally, the average treatment effect on the

treated (ATT) of access to electricity was calculated between the treated and the untreated individuals. The estimation was conducted both for the sample as a whole, and by gender. We also performed balancing tests to verify if there was any significant difference in the covariates between the matched groups.¹⁴ In general, we find using both the graphs and balancing tests that the kernel and radius matching algorithms produce the best propensity score matches, for both countries and all labour market outcomes. Therefore, the ATT effects produced by these two methods are our preferred PSM estimates.

Findings

The results of the average treatment effect on the treated using propensity score matching using the three matching methods are presented in Table 10. Overall, the impacts of electricity on employment are negligible for South Africa. For India, there is some evidence of a very small decrease in the probability of paid employment using our preferred matching algorithms, although mainly among men. On annual wages and number of hours worked, electricity seems to have a positive effect in both India and South Africa. However, the difference in the benefit is quite stark between men and women in the two countries: the wage gain is around three times as large for men as for women in South Africa, and around five times larger in India using our preferred estimates. In terms of number of hours worked, in India men increase their hours more due to electricity than women do. However, in South Africa, the increase in hours worked as a result of electrification is approximately equal across genders.

¹⁴ See Appendix Tables B1-B18 for the matched observations and covariate balancing tests.

Table 10. Average treatment effect on the treated (ATT) of electricity access with propensity score matching, by matching method

	India			South Africa		
	All	Male	Female	All	Male	Female
Employment						
Nearest neighbour	0.011 (0.017)	-0.029+ (0.017)	0.064* (0.030)	-0.003 (0.022)	-0.001 (0.038)	0.000 (0.027)
Kernel	-0.031*** (0.004)	-0.031*** (0.005)	-0.016** (0.006)	0.013 (0.012)	0.028+ (0.020)	0.005 (0.014)
Radius	-0.031*** (0.004)	-0.033*** (0.005)	-0.011+ (0.007)	0.002 (0.012)	0.029+ (0.021)	-0.000 (0.015)
Annual earnings						
Nearest neighbour	6475.60*** (742.25)	9108.62*** (915.34)	989.24 (1009.24)	5569.42** (1744.10)	9676.89** (2719.89)	3491.44+ (1796.41)
Kernel	7429.53*** (214.45)	9684.46*** (286.75)	2078.32*** (191.74)	7174.65** (1433.73)	10415.37** (2522.49)	3626.67** (1227.57)
Radius	6995.80*** (218.02)	9286.70*** (292.23)	1667.27*** (194.95)	6423.32** (1420.59)	9546.89** (2586.73)	3676.34** (1287.43)
Hours worked/year						
Nearest neighbour	145.72** (37.94)	196.06*** (43.53)	10.52 (70.16)	175.53* (70.60)	195.79+ (112.11)	104.04 (88.94)
Kernel	229.78*** (10.72)	263.81*** (13.36)	141.13*** (15.25)	243.70** (54.02)	256.91** (84.10)	268.57** (66.53)
Radius	222.46*** (11.11)	256.55*** (13.90)	135.03*** (15.80)	238.86** (56.74)	274.99** (94.51)	231.37** (68.24)

Source: IHDS 2005 and NIDS 2008, authors' calculations

Notes: Annual earnings are measured in Indian rupees for India and in Rands for South Africa. Standard errors in parentheses. The covariates age, gender, education, marital status and social group were used to calculate the propensity scores. + p<.10, * p<.05, ** p<.01, *** p<.001.

8. Panel estimation

While the PSM results presented above indicate the nature of the effect of electrification, they are unable to disentangle the effects of various factors. For example, do the increases in annual earnings result simply from longer hours worked, or is there an independent effect of

electrification on earnings? Given that the results present the average impact of treatment on the treated, what is the role of individual heterogeneity in response to electrification? The datasets for both countries can be matched as individual-level panel data, and therefore this section exploits the time series variation in access to electricity and labour market outcomes. Due to the ability to control for unobserved time-invariant heterogeneity, and to take into account some of the dynamics of household electrification, we believe that the results presented in this section are the most credible and informative estimates.

As described in Section 5, we matched individuals in the Indian data into a two-wave panel, which has an approximately seven-year interval between waves i.e. 2005 and 2011/12. All wave 1 households residing in the same village or urban neighbourhood were re-interviewed during wave 2. When households had divided, all split households were re-interviewed if there were located in the same village/neighbourhood. For some urban units where it was difficult to re-contact sufficient households, additional new households were randomly sampled and interviewed. No panel weights were provided to correct for any bias due to attrition. However, each cross-sectional wave has weights to adjust for differential sampling proportions and for the probability of primary units (villages or towns) being sampled. For South Africa, there are three waves at approximately two-year intervals. NIDS also attempts to track all original respondents, rather than taking the form of a rotating panel. The sample in subsequent waves consists of all resident household members from wave 1 and any further children of the women in these households (these are termed continuing sample members), plus any other person who resides with such individuals in later waves (temporary sample

members). Panel weights, designed to correct for attrition bias and supplied with the dataset, are used in the analysis that follows, as discussed further below (Brown et al., 2012).¹⁵

Attrition

In panel data, attrition is a concern as it may reduce the precision of estimation through decreased sample sizes, and may bias estimates if it is non-random. Attrition may occur in a number of ways: individuals may be tracked but refuse to continue to participate in the study, may be lost to follow-up, or may die between waves. Since this paper considers only those individuals living in rural areas, anyone who moves to an urban area is also considered here to be an attritor.

Table 11 below shows the extent of attrition from the two panels, based on those individuals aged 15 years and older in rural areas who were present in the wave 1 sample. For the South African data, 12 percent of individuals were lost from the panel by the second wave, and a further almost ten percent by the third wave.¹⁶ While these figures are not out of line with household panels in developing countries (Alderman et al., 2001), the fact that the sample size was small to begin with means that they remain something of a concern. However, although not shown here, some additional individuals also join the panel across waves. Such individuals may age into the sample, move to a rural area, or be lost to follow-up in wave 2 but tracked again in wave 3. As long as individuals are present in at least any two of the three waves, they are included in the empirical analysis for South Africa, despite not being shown in Table 11. For India, around 30 percent of the individuals dropped in the second wave of the

¹⁵ The NIDS datasets also contain wave-specific cross-sectional weights that can be used to analyse each wave as a cross-section of the South African population. See Brown et al. (2012) for further details.

¹⁶ In South Africa, attrition was slightly higher among individuals without access to electricity than those with electricity, although the difference was less than three percentage points.

survey. Similar to South Africa, some individuals joined in wave 2, but for our panel analysis we do not consider them since they are present only in one wave. It is not surprising that the attrition rate is higher for India than for South Africa, due to the substantially larger time lag between waves. Nonetheless, the Indian dataset is sufficiently large that the loss of observations is not much of a concern, provided that attrition bias does not result.

Table 11. Sample size and attrition of rural individuals aged 15 and older, by wave

	India	South Africa
Sample size		
Wave 1	215,714	9,687
Wave 2	150,988	8,492
Wave 3	-	7,672
Attrition rate		
Wave 1 to Wave 2	30.02	12.34
Wave 2 to Wave 3	-	9.66

Source: IHDS (2005 and 2011/12) and NIDS (2008, 2010/11 and 2012), authors' calculations

Note: Attrition only of those individuals who had a minimum age of 15 years in the first wave. The figures are not weighted.

We use two common panel methods to determine whether the attrition was random: a probit model for the probability of attrition and the Beckett, Gould, Lillard and Welch (BGLW) test (Fitzgerald et al., 1998). Both methods use an indicator variable for whether an individual who is present in one wave will attrite in the subsequent wave. For South Africa, two such variables are defined, since attrition may occur in two stages. For each country, the tests are conducted separately for each labour market outcome.¹⁷ For India, attrition is found to be non-random with respect to each labour market outcome, at only a five percent level for earnings but at better than a 0.1 percent level for employment status and hours worked. We therefore

¹⁷ The test results are displayed in Appendix table C1.

construct inverse probability weights to correct for attrition (Fitzgerald et al., 1998; Contoyannis et al., 2004), which are applied to the models estimated in Table 14.¹⁸

For South Africa, there is non-random attrition with respect only to employment status, and only from wave 1 to wave 2. Using the panel weights supplied with the NIDS data, which have been calibrated and adjusted for attrition, produces attrition test results that are random, suggesting that the weights perform well with respect to employment status. The attrition is found to be random with respect to both earnings and hours worked for both of the wave transitions.¹⁹ We therefore do not apply any further correction procedures for selective attrition to the South African data.

Transitions

In order to estimate the causal effect of access to electricity on labour market outcomes using the panel, it is necessary to have sufficient variation in electrification status within individuals across time. In addition, the extent of changes in access to electrification at the individual level is interesting in its own right. This section therefore compares transition matrices of electrification status for the two countries.

In India, around 41 percent of individuals did not have access to electricity in both the waves while around 96 percent of those with electricity maintained their access. Almost 60 percent of individuals gained access to electricity from one wave to the next, while less than five percent lost electricity access. Again, the large gain in electrification in India is not surprising,

¹⁸ This method involves estimating probit models for non-attrition, conditional on observable characteristics which include the baseline values of the covariates. The inverse of the fitted probabilities from these models are used to weight observations in wave 1 in the subsequent estimations. The resulting standard errors produce conservative inferences (Contoyannis et al., 2004).

¹⁹ If the tests for South Africa are performed at the level of the sample, without using the panel weights, most of the attrition is found to be non-random. The panel weights supplied by NIDS are therefore successful in correcting for non-random attrition with respect to the labour market outcomes examined here.

given the seven-year period between waves and the large roll-out of rural electrification programmes over this time.

Table 12. Transitions between electrification states, India

		Wave 2		
		No electricity	Electricity	Total
Wave 1	No electricity	40.66	59.34	100
	Electricity	4.43	95.57	100
	Total	14.54	85.46	100

Source: IHDS (2005 and 2011/12), authors' calculations

The South African NIDS panel tracks individuals, but not households, over time. An individual's electricity access status may change over time either through the household in which the individual is living becoming electrified, or through the individual moving from a non-electrified to an electrified household, or vice versa. It is not possible to distinguish between these two cases in the NIDS data, since there is no consistent household identifier across waves. Table 13 below shows the transitions estimated separately by wave, with the top part illustrating transitions between wave 1 and wave 2, and the bottom part wave 2 to wave 3. In South Africa, more than 80 percent of individuals without access to electricity in 2008 remained in this state by wave 2, while 75 percent of those with electricity maintained their access across this period. Almost 20 percent of individuals gained access to electricity, while almost a quarter lost their electricity access. Between waves 2 and 3, the gain in access to electricity was much larger at 37 percent of initially non-electrified households, while less than 14 percent lost electricity access. The gain in electrification is smaller than for India, but losses of access to electricity are quite substantial.

Table 13. Transitions between electrification states by wave, South Africa

		Wave 2		
		No electricity	Electricity	Total
Wave 1	No electricity	80.25	19.75	100
	Electricity	24.36	75.64	100
	Total	43.74	56.26	100
		Wave 3		
		No electricity	Electricity	Total
Wave 2	No electricity	62.92	37.08	100
	Electricity	13.74	86.26	100
	Total	34.94	65.06	100

Source: NIDS (2008, 2010/11 and 2012), authors' calculations

These transition matrices show that quite a large number of South Africans lost access to electricity, especially between 2008 and 2010/11, which confirms the finding of other research (Harris, 2016). Although this cannot be confirmed directly, many of these cases are likely to represent disconnections due to non-payment for electricity, as South Africa experienced an economic recession in 2009 following the global financial crisis.

Findings

Using the panel, models are again estimated for the three key labour market outcome variables, with the results presented in Table 14. For the binary employment variable, where a fixed effects estimation is not appropriate, only a random effects probit model is estimated. For wages and hours worked, the models are estimated in both fixed effects and random effects formulations, and a Hausman test is conducted to compare the estimates. The fixed effects estimations are also performed with weights designed to correct for non-random attrition.²⁰ For all models, the covariates are the same as for the cross-sectional estimations.

For both countries, electrification has no effect on employment in the model for all individuals. However, having access to electricity decreases the probability of being employed

²⁰ Weighting is not supported for random effects estimation.

for men, although significantly so only in India by a substantial margin of 0.2. Women in households with access to electricity are less likely to work in South Africa, although only marginally significantly so, while Indian women become more likely to work at least 240 hours in a year when their household accesses electricity. The increase in women's likelihood of employment is approximately half as large as the decline for men.

Table 14. Summary of fixed and random effects estimation of the effect of access to electricity on labour market outcomes, by gender

	India			South Africa		
	All	Men	Women	All	Men	Women
Employment						
Random effects	-0.0185 (0.0401)	- 0.219*** (0.0634)	0.120* (0.0513)	-0.0469 (0.0333)	-0.00058 (0.0518)	-0.0774+ (0.0427)
Log of annual earnings						
Fixed effects	0.101*** (0.0285)	0.0943** (0.0357)	0.103* (0.0469)	0.138* (0.0629)	0.0753 (0.0863)	0.195* (0.0932)
FE (attrition-corrected)	0.103*** (0.0272)	0.0960** (0.0356)	0.105** (0.0407)	0.178+ (0.0942)	0.150 (0.142)	0.183+ (0.104)
Random effects	0.0300+ (0.0168)	0.0323 (0.0217)	0.0359 (0.0259)	-0.00636 (0.0329)	-0.00692 (0.0480)	-0.0101 (0.0446)
Hausman p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Log of hours worked						
Fixed effects	- 0.198*** (0.0365)	- 0.177*** (0.0431)	-0.204** (0.0687)	0.177** (0.0606)	0.228** (0.0817)	0.119 (0.0905)
FE (attrition-corrected)	- 0.199*** (0.0394)	- 0.180*** (0.0469)	-0.202** (0.0721)	0.147* (0.0710)	0.273** (0.0955)	-0.0173 (0.103)
Random effects	- 0.092*** (0.0221)	- 0.106*** (0.0267)	-0.0296 (0.0389)	0.0768** (0.0288)	0.0453 (0.0413)	0.0995* (0.0400)
Hausman p-value	0.0000	0.0000	0.0000	0.0004	0.0111	0.0092

Source: IHDS (2005 and 2011/12) and NIDS (2008, 2010/11 and 2012), authors' calculations

Notes: Standard errors in parentheses. + p<.10, * p<.05, ** p<.01, *** p<.001. All models include a complete set of control variables, as in the cross-sectional analysis. Attrition-corrected fixed effects models estimated using inverse probability weights.

When using the fixed effects estimation method, household electrification raises annual earnings for all individuals in both countries. The effect is insignificant only for men in South

Africa. In contrast, the random effects models typically estimate a positive but insignificant effect of electrification on earnings in India, and a negative but insignificant effect in South Africa. However, the Hausman test strongly rejects the hypothesis that the random effects estimator is consistent, indicating that the fixed effects model is preferred for all groups in both countries. This suggests the presence of unobserved heterogeneity in earnings outcomes in both countries. In India, earnings increase by approximately ten log points for both genders when the household accesses electricity, while the magnitude is approximately twice as large for women in South Africa. Correcting for the potential non-randomness of attrition between waves does not alter any of these conclusions, although the standard errors of the estimates typically increase somewhat in line with the conservative nature of the weighting procedure.

In India, electrification decreases annual hours worked for all groups and in both fixed and random effects estimations. The decrease is insignificant only for women in the random effects model. In contrast, in South Africa, electrification raises hours worked. The increase is significant for all individuals and for men in the fixed effects model, and for all individuals and for women in the random effects model. In general, for both countries, the magnitude of the effect of electricity on hours worked is estimated to be substantially smaller under the random than the fixed effects estimation. However, the Hausman tests again indicate that the fixed effects models are preferred, with the null hypothesis being rejected at around the one percent level in South Africa and at all levels for India. On the whole, unobserved heterogeneity in labour market outcomes is found to be present in both countries, which is likely to contaminate models estimated purely at a cross-sectional level or when using random effects estimation. In contrast, fixed effects estimation provides consistent estimates

under such circumstances, and is thus the preferred method across labour market outcomes and for both countries.

In general, the findings from the panel estimation emphasise the importance of being able to account for changes over time. The benefits of electrification accrue not only at a single point in time, but also affect the planning and behaviour of individuals as time progresses. Therefore, the labour market impacts are also likely to evolve over time.

9. Discussion and conclusion

We used multiple econometric techniques to estimate the impacts of having access to electricity in two large and developing economies. We find that having access to electricity improves some labour market outcomes, but that the nature and extent of the impact of access to electricity differs across labour market indicators, gender, and estimation method. The most robust findings for India are that access to electricity increases the probability of working in paid employment for women, and increases annual earnings, especially for men. For South Africa, there are fewer labour market impacts, which is consistent with a labour market with less absorptive capacity. There is some evidence of improvements in earnings, mainly for women, and increased hours spent in paid employment, mainly for men.

For India, the preferred panel results generally confirm the cross-sectional regression findings for men: electrification raises earnings but decreases hours worked, although the employment effects are contradictory. For women, however, while the panel results confirm that electrification raises the probability of being in paid employment, the results for earnings and hours worked are inconsistent. Based on the panel, the estimated decrease in hours

worked, accompanied by an increase in earnings, suggests that electrification improves welfare for both men and women in India.

For South Africa, the cross-sectional results yielded few significant findings, none at better than a five percent level, and with the direction of the effect of electrification on a given labour market outcome differing across estimation method. In part, this is likely to be due to the small sample size of the cross-section. Exploiting the time series dimension of the data yielded some more statistically significant findings, although differences in the direction of the effect of electrification across estimation method remained evident in the case of earnings. Electrification fails to improve the probability of being employed for either gender. The preferred (fixed effects) results indicate substantial gender differences in outcomes among the employed in South Africa. Access to electricity raises earnings, but only significantly so for women, and raises hours worked, but only significantly so for men. This again suggests that there are welfare improvements that result from electrification, although less clearly so than in the case of India.

Although, electrification does improve some labour market outcomes it does so very differently in the two locations. A significant gender imbalance in the labour market is a common trait in the two countries. Therefore, the variation in labour market outcomes due to electricity is a manifestation of that imbalance. In India, labour force participation rates have been falling consistently for women in the last few years. Several theories have been posited to explain this phenomenon: increased educational enrolment of women, an income effect (as household incomes rise, women withdraw from the labour force), increased male education (increases in male education lead to higher household incomes), lack of job opportunities, and measurement issues (Olsen and Mehta, 2006; Neff et al., 2012; Patel,

2012; Klasen and Pieters, 2013; Lahoti and Swaminathan, 2013). However, electrification seems to have a statistically positive effect on female employment, thus putting women back into the labour force. This could occur through several different channels. First, access to electricity helps to free up women's time which she could use for employment generating activities. Second, electrification provides more hours of light at home thus, raising the possibility of income generation activities at home. Third, more light hours could help children to study and thus improve their later earning potential. Another aspect of this impact of electrification can also be explained in the decrease in the hours worked on paid employment. Women, when they join the labour force, may do so through self-employment activity or helping run a family business.

In South Africa, the impact of electrification on labour market outcomes was found to be more muted. Electrification fails to significantly improve the probability of being employed, in either wage employment or self-employment. The extremely high levels of unemployment in the rural areas of South Africa, as outlined in Section 2, suggest that even if the labour-saving impacts of electrification result in increased labour force participation, as some previous authors have suggested (Dinkelman, 2011), these do not translate into significant increases in employment. Access to electricity raises earnings, but only significantly so for women in the panel results. Thus women who are able to access paid employment enjoy higher wages, perhaps because their labour market productivity increases when electrification reduces the intensity required to carry out home production tasks. For men, the PSM results suggest that when hours worked are not controlled for, men's earnings increase quite substantially if the household is electrified. However, the panel results indicate that although there is a

significant increase in hours spent in paid employment among those who are employed, there is no significant independent rise in earnings after controlling for hours worked.

A notable result from the transition matrix for the South African data is that there is considerable 'churning' in access to electricity. Nearly twenty percent of individuals lost access to electricity between waves of the panel. This is a major concern for policy-makers: the roll-out of rural electrification schemes is unlikely to achieve the desired improvements in welfare if households subsequently become disconnected from the electricity grid due to lack of payment or technical issues with the electricity supply. If some of the benefits of electrification can only be gained in the medium term, once individuals have adapted their behaviour, then a lack of consistent access to electricity is likely to dampen the findings. This may be one reason why the results for South Africa are less statistically significant than those for India. Future research could focus on whether the labour market effects of a loss of access to electricity are symmetrical to the electrification effects. For India, reliable electric supply is a major issue. In order to fully realize the benefits of electrification, policy emphasis should be on providing a continuous power supply to the households.

While it is clear that rural electrification does have some welfare impacts, it cannot be used as a master stroke for all development problems. This cross-country study shows that there isn't necessarily a universal benefit of electrification, but that one rather needs to consider the local context in terms of social and political structure, gender roles and labour absorptive capacity to understand and realize the effects of rural electricity programmes.

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Appendices

Appendix A: Instrumental variables estimations

Table A1. First stage equation to create the instrument for household electrification status, by country

Marginal effect	India	South Africa
Percentage of households in local area that have electricity access	0.00441*** (0.000265)	0.00594*** (0.000711)
Male	-0.00220 (0.00367)	0.00492 (0.0129)
Age (years)	0.000287 (0.000750)	-0.00519+ (0.00308)
Age squared	-0.00000275 (0.00000761)	0.0000570* (0.0000283)
Marital Status (Ref-Married)		
Single	0.00278 (0.00964)	0.0218 (0.0298)
Widowed	-0.00286 (0.00933)	-0.0191 (0.0253)
Divorced, separated	-	0.0611 (0.0472)
Other	-	-0.0248 (0.0454)
Years of education	0.00670*** (0.00192)	0.00653 (0.00602)
Years of education squared	-0.000670*** (0.000145)	-0.000782+ (0.000446)
No. of children (0-14 years)	-0.0114** (0.00350)	-0.00865 (0.00910)
No. of teens (15-21 years)	-0.00641 (0.00437)	0.0262* (0.0114)
No. of adults (22+ years)	-0.00330 (0.00382)	0.000864 (0.00966)
Household assets	0.0476*** (0.00181)	0.0441*** (0.00676)

Marginal effect	India	South Africa
Highest education of an adult in the household (years)	-0.000776 (0.00116)	0.00147 (0.00323)
Log(consumption)	-0.0308** (0.0102)	0.0214 (0.0227)
Home ownership	-0.0558** (0.0215)	-0.0962** (0.0365)
Constant	0.195** (0.0695)	-0.115 (0.217)
Sample size	91,583	5,663

Source: IHDS 2005 and NIDS 2008, authors' calculations

Notes: Standard errors in parentheses. Estimates are weighted to population levels. + p<.10, * p<.05, ** p<.01, *** p<.001. The dependent variable takes on a value of one if the individual lives in a household with access to electricity, zero otherwise

Table A2. Probit models displaying full set of covariates for employment status, by country

Marginal effect	India		South Africa	
	Probit	IV Probit	Probit	IV Probit
Household electricity access	0.0372*** (0.00755)	0.330*** (0.0995)	-0.0201 (0.0355)	-0.308 (0.212)
Male	0.233*** (0.00734)	0.956*** (0.0201)	0.207*** (0.0255)	0.518*** (0.0635)
Age (years)	0.00351*** (0.000235)	0.0145*** (0.00103)	0.00220 (0.00142)	0.00534 (0.00365)
Marital Status (Ref-Married)				
Single	-0.119*** (0.00916)	-0.437*** (0.0294)	0.0121 (0.0332)	0.0351 (0.0836)
Widowed	--	--	0.0136 (0.0384)	0.0295 (0.0965)
Divorced, separated	--	--	0.109* (0.0552)	0.291* (0.141)
Other	-0.0752*** (0.00970)	-0.315*** (0.0343)	0.0277 (0.0463)	0.0556 (0.114)
Years of education	-0.00327*** (0.000781)	-0.0126*** (0.00325)	0.00820+ (0.00431)	0.0194+ (0.0112)
No. of children (0-14 years)	0.00908*** (0.00142)	0.0405*** (0.00592)	-0.0151+ (0.00810)	-0.0413* (0.0204)

Marginal effect	India		South Africa	
	Probit	IV Probit	Probit	IV Probit
No. of teens (15-21 years)	-0.000876 (0.00215)	-0.00343 (0.00895)	-0.000493 (0.0139)	0.00552 (0.0354)
No. of adults (22+ years)	-0.0162*** (0.00167)	-0.0695*** (0.00706)	-0.0173 (0.0182)	-0.0422 (0.0469)
Household assets	-0.0104*** (0.000834)	-0.0532*** (0.00641)	0.0170** (0.00522)	0.0563** (0.0175)
Highest education of an adult in the household (years)	-0.00126+ (0.000660)	-0.00472+ (0.00278)	0.00388 (0.00444)	0.0110 (0.0114)
Log(consumption)	0.0214*** (0.00503)	0.100*** (0.0207)	0.0571** (0.0199)	0.142** (0.0492)
Home ownership	0.0930*** (0.0176)	0.354*** (0.0583)	-0.239*** (0.0412)	-0.642*** (0.113)
Sample size	93,697	91,583	5,663	5,663

Source: IHDS 2005 and NIDS 2008, authors' calculations

Notes: Standard errors in parentheses. Estimates are weighted to population levels. + p<.10, * p<.05, ** p<.01, *** p<.001. The dependent variable takes on a value of one if the individual works at least 240 hours per year, zero otherwise. The probit model is also the selection equation for the Heckman model in the following table.

Table A3. OLS and IV-2SLS models for the log of annual earnings amongst the employed, with and without sample selection corrections, full sample

	India				South Africa			
	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)
Household electricity access	0.0961*** (0.0164)	0.0335+ (0.0190)	0.0925* (0.0439)	0.00377 (0.0446)	0.183 (0.146)	-0.0882 (0.133)	0.376 (0.424)	-0.102 (0.308)
Male	0.396*** (0.0138)	0.656*** (0.0234)	0.397*** (0.0148)	0.656*** (0.0232)	0.750*** (0.0807)	0.0178 (0.109)	0.742*** (0.0787)	0.0221 (0.109)
Age (years)	0.0219*** (0.00226)	0.0576*** (0.00385)	0.0209*** (0.00224)	0.0570*** (0.00359)	0.177*** (0.0211)	-0.0509+ (0.0303)	0.176*** (0.0207)	-0.0433 (0.0296)
Age squared	-0.000183*** (0.0000264)	-0.000648*** (0.0000465)	-0.000174*** (0.0000257)	-0.000643*** (0.0000429)	-0.00201*** (0.000216)	0.000511 (0.000321)	-0.00200*** (0.000215)	0.000435 (0.000312)
Marital Status (Ref-Married)								
Single	-0.0332* (0.0169)	-0.146*** (0.0188)	-0.0344* (0.0169)	-0.149*** (0.0192)	-0.287+ (0.147)	-0.237 (0.154)	-0.271+ (0.154)	-0.209 (0.163)
Widowed	--	--	--	--	-0.211 (0.179)	-0.296 (0.249)	-0.212 (0.179)	-0.258 (0.243)
Divorced, separated	--	--	--	--	-0.352 (0.265)	-0.550* (0.241)	-0.354 (0.269)	-0.525* (0.241)
Other	-0.0148 (0.0196)	-0.0210 (0.0205)	-0.0105 (0.0200)	-0.0201 (0.0210)	-0.156 (0.169)	-0.484* (0.232)	-0.116 (0.194)	-0.467+ (0.242)

	India				South Africa			
	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)
Years of education	-0.00384 (0.00399)	-0.0124** (0.00391)	-0.00528 (0.00406)	-0.0143*** (0.00396)	-0.109*** (0.0309)	-0.0577 (0.0408)	-0.110*** (0.0308)	-0.0476 (0.0392)
Years of education squared	0.00438*** (0.000343)	0.00432*** (0.000342)	0.00446*** (0.000347)	0.00443*** (0.000344)	0.0188*** (0.00267)	0.0103** (0.00331)	0.0185*** (0.00266)	0.00983** (0.00319)
No. of children (0-14 years)	-0.00340 (0.00365)	-0.00783* (0.00372)	-0.00199 (0.00375)	-0.00645+ (0.00383)	-0.0291 (0.0447)	0.0490 (0.0584)	-0.0221 (0.0463)	0.0401 (0.0564)
No. of teens (15-21 years)	0.0182*** (0.00540)	0.0133* (0.00559)	0.0200*** (0.00539)	0.0138* (0.00580)	-0.220* (0.0973)	-0.163 (0.140)	-0.223* (0.0982)	-0.157 (0.137)
No. of adults (22+ years)	0.0173*** (0.00454)	-0.00601 (0.00488)	0.0168*** (0.00471)	-0.00626 (0.00505)	-0.181+ (0.0999)	-0.0976 (0.181)	-0.188+ (0.0979)	-0.0903 (0.177)
Hours worked/year	0.00438*** (0.000343)	0.00432*** (0.000342)	0.00446*** (0.000347)	0.00443*** (0.000344)	0.772*** (0.0746)	0.463*** (0.0658)	0.763*** (0.0745)	0.451*** (0.0650)
Self-employed	-0.0780** (0.0270)	-0.105*** (0.0270)	-0.0752** (0.0275)	-0.0984*** (0.0277)	-0.0638 (0.127)	0.0700 (0.121)	-0.0634 (0.129)	0.0496 (0.125)
Constant	0.307** (0.0970)	-0.369** (0.115)	0.321** (0.0973)	-0.376*** (0.113)	-0.642 (0.897)	8.577*** (1.123)	-0.672 (0.911)	8.432*** (1.137)
Selection Ln(sigma)		-0.527*** (0.0173)		-0.523*** (0.0163)		0.792*** (0.0696)		0.797*** (0.0688)

	India				South Africa			
	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)
Observations	31,755	62,298	31,016	61,864	2,262	5,515	2,262	5,602

Source: IHDS 2005 and NIDS 2008, authors' calculations

Notes: Standard errors in parentheses

Estimates are weighted to population levels

+ p<.10, * p<.05, ** p<.01, *** p<.001

Table A4. OLS and IV-2SLS models for the log of annual hours worked amongst the employed, with and without sample selection corrections, full sample

	India				South Africa			
	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)
Household electricity access	0.000891 (0.0225)	0.00163 (0.0225)	0.291*** (0.0786)	0.318*** (0.0825)	0.0710 (0.0844)	0.0595 (0.0496)	-0.240 (0.219)	-0.0782 (0.148)
Male	0.383*** (0.0154)	0.432*** (0.0165)	0.407*** (0.0173)	0.442*** (0.0173)	0.146** (0.0508)	-0.340*** (0.0783)	0.157** (0.0515)	-0.348*** (0.0777)
Age (years)	0.0180*** (0.00270)	0.0253*** (0.00270)	0.0196*** (0.00280)	0.0263*** (0.00271)	0.0386** (0.0131)	-0.100*** (0.0159)	0.0385** (0.0131)	-0.0992*** (0.0157)
Age squared	-0.000250*** (0.0000314)	-0.000343*** (0.0000322)	-0.000266*** (0.0000326)	-0.000355*** (0.0000322)	-0.000514*** (0.000146)	0.00109*** (0.000174)	-0.000521*** (0.000146)	0.00107*** (0.000171)
Marital Status (Ref-Married)								
Single	-0.0408+ (0.0220)	-0.0636** (0.0227)	-0.0312 (0.0235)	-0.0560* (0.0236)	-0.0345 (0.0729)	-0.00245 (0.0894)	-0.0347 (0.0731)	0.0257 (0.0869)

	India				South Africa			
	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)
Widowed	--	--	--	--	-0.317* (0.155)	-0.273 (0.219)	-0.299+ (0.155)	-0.256 (0.207)
Divorced, separated	--	--	--	--	0.0801 (0.147)	-0.0494 (0.153)	0.0945 (0.147)	-0.0107 (0.153)
Other	0.0898*** (0.0246)	0.0872*** (0.0245)	0.0973*** (0.0245)	0.0963*** (0.0241)	0.0883 (0.108)	0.00476 (0.116)	0.0440 (0.106)	0.0164 (0.115)
Years of education	-0.00668 (0.00434)	-0.00759+ (0.00436)	-0.00907+ (0.00465)	-0.0102* (0.00455)	0.00666 (0.0245)	0.0201 (0.0277)	0.00935 (0.0251)	0.0246 (0.0269)
Years of education squared	0.00136*** (0.000302)	0.00142*** (0.000304)	0.00176*** (0.000348)	0.00175*** (0.000333)	0.000154 (0.00172)	-0.00289 (0.00178)	-0.000117 (0.00174)	-0.00340+ (0.00174)
No. of children (0- 14 years)	-0.00985* (0.00458)	-0.0112* (0.00458)	-0.00724 (0.00459)	-0.00780+ (0.00451)	-0.0589** (0.0195)	-0.0105 (0.0258)	-0.0684*** (0.0203)	-0.0176 (0.0258)
No. of teens (15-21 years)	-0.0461*** (0.00672)	-0.0464*** (0.00669)	-0.0417*** (0.00719)	-0.0411*** (0.00676)	-0.0556 (0.0372)	-0.0569 (0.0534)	-0.0472 (0.0381)	-0.0506 (0.0513)
No. of adults (22+ years)	-0.0255*** (0.00549)	-0.0282*** (0.00547)	-0.0200*** (0.00565)	-0.0240*** (0.00551)	0.0124 (0.0182)	0.0292 (0.0615)	0.0204 (0.0191)	0.0293 (0.0578)

	India				South Africa			
	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)
No. of household assets	0.0330*** (0.00242)	0.0308*** (0.00241)	0.0130* (0.00548)	0.0120* (0.00496)	0.0416*** (0.00913)	-0.0167 (0.0106)	0.0551*** (0.0135)	-0.00579 (0.0124)
Highest education of adult in household (years)	-0.00748** (0.00244)	-0.00841*** (0.00242)	-0.00839*** (0.00234)	-0.00910*** (0.00228)	0.00171 (0.0136)	0.000859 (0.0161)	0.00310 (0.0135)	0.00354 (0.0156)
House is owned	-0.187*** (0.0274)	-0.185*** (0.0275)	-0.163*** (0.0276)	-0.150*** (0.0289)	-0.453*** (0.0670)	0.115 (0.0982)	-0.493*** (0.0734)	0.0829 (0.0948)
Self-employed	-0.399*** (0.0386)	-0.401*** (0.0385)	-0.394*** (0.0400)	-0.401*** (0.0381)	-0.0107 (0.0878)	0.0599 (0.0516)	-0.00739 (0.0901)	0.0573 (0.0504)
Constant	6.653*** (0.0633)	6.491*** (0.0650)	6.545*** (0.0715)	6.379*** (0.0710)	6.454*** (0.318)	10.63*** (0.440)	6.609*** (0.329)	10.61*** (0.439)
Selection Ln(sigma)		-0.482*** (0.0136)		-0.483*** (0.0132)	0.331*** (0.0541)		0.329*** (0.0521)	
Observations	31,760	62,305	31,020	61,871	2,139	5,590	2,139	5,677

Source: IHDS 2005 and NIDS 2008, authors' calculations

Notes: Standard errors in parentheses

Estimates are weighted to population levels

+ p<.10, * p<.05, ** p<.01, *** p<.001

Table A5. Probit models displaying full set of covariates for employment status, by country and gender

Marginal effect	India				South Africa			
	Men		Women		Men		Women	
	Probit	IV Probit	Probit	IV Probit	Probit	IV Probit	Probit	IV Probit
Household electricity access	0.00660 (0.00468)	-0.176 (0.120)	0.0758*** (0.0131)	0.669*** (0.123)	0.0333 (0.0437)	-0.321 (0.326)	-0.0612 (0.0386)	-0.347 (0.226)
Age (years)	0.00119*** (0.000154)	0.00943*** (0.00151)	0.00522*** (0.000445)	0.0150*** (0.00132)	-0.00205 (0.00165)	-0.00558 (0.00449)	0.00324+ (0.00174)	0.00828+ (0.00452)
Marital Status (Ref-Married)								
Single	-0.127*** (0.0111)	-0.828*** (0.0420)	-0.0221 (0.0165)	-0.0501 (0.0461)	-0.190*** (0.0489)	-0.514*** (0.139)	0.121** (0.0375)	0.326** (0.0979)
Widowed	--	--	--	--	-0.212* (0.0912)	-0.502* (0.251)	0.0545 (0.0391)	0.139 (0.103)
Divorced, separated	--	--	--	--	-0.0215 (0.0765)	-0.0565 (0.227)	0.204** (0.0712)	0.543** (0.182)
Other	-0.0456*** (0.00964)	-0.432*** (0.0654)	-0.0974*** (0.0155)	-0.286*** (0.0402)	-0.0254 (0.0534)	-0.116 (0.159)	0.0738 (0.0537)	0.194 (0.138)
Years of education	-0.00116* (0.000491)	-0.00948* (0.00413)	-0.0119*** (0.00183)	-0.0308*** (0.00498)	0.00511 (0.00607)	0.0131 (0.0163)	0.00983+ (0.00519)	0.0245+ (0.0138)
No. of children (0-14 years)	0.00355*** (0.000923)	0.0287*** (0.00806)	0.0127*** (0.00288)	0.0430*** (0.00835)	-0.0118 (0.0109)	-0.0379 (0.0303)	-0.0181* (0.00884)	-0.0495* (0.0226)

Marginal effect	India				South Africa			
	Men		Women		Men		Women	
	Probit	IV Probit	Probit	IV Probit	Probit	IV Probit	Probit	IV Probit
No. of teens (15-21 years)	-0.00291* (0.00137)	-0.0263* (0.0117)	-0.00200 (0.00394)	-0.00398 (0.0112)	-0.0262 (0.0185)	-0.0606 (0.0499)	0.0160 (0.0152)	0.0470 (0.0402)
No. of adults (22+ years)	-0.00554*** (0.00112)	-0.0530*** (0.00956)	-0.0281*** (0.00318)	-0.0790*** (0.00921)	-0.0221 (0.0208)	-0.0544 (0.0574)	-0.0110 (0.0167)	-0.0281 (0.0450)
Household assets	-0.00445*** (0.000546)	-0.0233** (0.00795)	-0.0160*** (0.00145)	-0.0723*** (0.00780)	0.0156** (0.00567)	0.0597** (0.0190)	0.0177** (0.00602)	0.0571** (0.0214)
Highest education of an adult in the household (years)	-0.000279 (0.000448)	-0.00337 (0.00374)	-0.00111 (0.00113)	-0.00208 (0.00323)	-0.000982 (0.00660)	0.000165 (0.0171)	0.00506 (0.00439)	0.0140 (0.0116)
Log(consumption)	0.0145*** (0.00298)	0.119*** (0.0252)	0.0283** (0.00969)	0.107*** (0.0276)	0.0696** (0.0221)	0.187** (0.0582)	0.0522* (0.0234)	0.134* (0.0603)
Home ownership	0.0466*** (0.0133)	0.304*** (0.0761)	0.134*** (0.0304)	0.397*** (0.0794)	-0.305*** (0.0394)	-0.970*** (0.142)	-0.121* (0.0554)	-0.324* (0.140)
Sample size	47,169	46,118	46,528	45,465	2,025	2,025	3,638	3,638

Source: IHDS 2005 and NIDS 2008, authors' calculations

Notes: Standard errors in parentheses. Estimates are weighted to population levels. + p<.10, * p<.05, ** p<.01, *** p<.001. The dependent variable takes on a value of one if the individual works at least 240 hours per year, zero otherwise. The probit model is also the selection equation for the Heckman model in the following tables.

Table A6. OLS and IV-2SLS models for the log of annual earnings amongst the employed, with and without sample selection corrections, men

	India				South Africa			
	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)
Household electricity access	0.135*** (0.0167)	0.0986*** (0.0182)	0.145** (0.0452)	0.0890+ (0.0456)	-0.00524 (0.163)	-0.308* (0.150)	0.461 (0.449)	-0.239 (0.326)
Age (years)	0.0288*** (0.00260)	0.0550*** (0.00381)	0.0281*** (0.00263)	0.0563*** (0.00369)	0.184*** (0.0298)	0.0446 (0.0443)	0.182*** (0.0302)	0.0539 (0.0448)
Age squared	-0.000249*** (0.0000307)	-0.000592*** (0.0000460)	-0.000244*** (0.0000305)	-0.000613*** (0.0000438)	-0.00211*** (0.000336)	-0.000455 (0.000489)	-0.00208*** (0.000345)	-0.000554 (0.000498)
Marital Status (Ref-Married)								
Single	-0.0111 (0.0193)	-0.146*** (0.0238)	-0.0115 (0.0196)	-0.157*** (0.0243)	-0.608*** (0.173)	-0.202 (0.179)	-0.552*** (0.158)	-0.182 (0.182)
Widowed	--	--	--	--	-0.436+ (0.261)	-0.305 (0.487)	-0.526+ (0.292)	-0.310 (0.480)
Divorced, separated	--	--	--	--	-0.782+ (0.437)	-0.477 (0.391)	-0.756+ (0.436)	-0.457 (0.396)
Other	-0.103** (0.0340)	-0.165*** (0.0352)	-0.0982** (0.0367)	-0.171*** (0.0364)	-0.362* (0.179)	-0.588** (0.197)	-0.263 (0.184)	-0.573** (0.191)
Years of education	-0.00000454 (0.00410)	0.00170 (0.00434)	-0.00211 (0.00425)	-0.00125 (0.00442)	-0.112** (0.0395)	-0.0820+ (0.0472)	-0.113** (0.0402)	-0.0805+ (0.0458)

	India				South Africa			
	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)
Years of education squared	0.00386*** (0.000345)	0.00329*** (0.000363)	0.00398*** (0.000352)	0.00342*** (0.000366)	0.0186*** (0.00339)	0.0143*** (0.00404)	0.0179*** (0.00333)	0.0142*** (0.00400)
No. of children (0-14 years)	-0.00814* (0.00379)	-0.0113** (0.00391)	-0.00620 (0.00378)	-0.00937* (0.00386)	-0.0669 (0.0578)	0.0428 (0.0647)	-0.0563 (0.0571)	0.0238 (0.0636)
No. of teens (15-21 years)	0.0198*** (0.00579)	0.0165** (0.00588)	0.0222*** (0.00573)	0.0187** (0.00605)	-0.149+ (0.0801)	-0.0411 (0.0948)	-0.156+ (0.0827)	-0.0374 (0.0937)
No. of adults (22+ years)	0.0239*** (0.00499)	0.0121* (0.00525)	0.0235*** (0.00506)	0.0113* (0.00529)	-0.171+ (0.0947)	-0.124 (0.201)	-0.183+ (0.0952)	-0.116 (0.201)
Hours worked/year	1.126*** (0.0123)	1.116*** (0.0121)	1.126*** (0.0121)	1.118*** (0.0125)	0.651*** (0.0777)	0.382*** (0.0917)	0.628*** (0.0872)	0.378*** (0.101)
Self-employed	-0.0909** (0.0318)	-0.109*** (0.0316)	-0.0867** (0.0323)	-0.102** (0.0325)	-0.149 (0.193)	-0.0361 (0.194)	-0.158 (0.200)	-0.0860 (0.194)
Constant	0.128 (0.107)	-0.231* (0.116)	0.136 (0.106)	-0.269* (0.118)	1.229 (0.786)	6.779*** (1.378)	1.137 (0.802)	6.538*** (1.418)
Selection Ln(sigma)		-0.545*** (0.0163)		-0.533*** (0.0160)		0.524*** (0.0953)		0.523*** (0.102)
Observations	21,910	31,929	21,367	31,594	1,082	1,932	1,082	1,978

Source: IHDS 2005 and NIDS 2008, authors' calculations

Notes: Standard errors in parentheses

Estimates are weighted to population levels
+ p<.10, * p<.05, ** p<.01, *** p<.001

Table A7. OLS and IV-2SLS models for the log of annual hours worked amongst the employed, with and without sample selection corrections, men

	India				South Africa			
	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)
Household electricity access	-0.0390+ (0.0229)	-0.0388+ (0.0229)	0.152* (0.0771)	0.163* (0.0798)	0.126 (0.116)	-0.00993 (0.0582)	-0.566+ (0.321)	-0.322+ (0.182)
Age (years)	0.0169*** (0.00293)	0.0218*** (0.00290)	0.0170*** (0.00307)	0.0222*** (0.00302)	0.0297 (0.0194)	-0.0617** (0.0190)	0.0330+ (0.0191)	-0.0617** (0.0187)
Age squared	-0.000243*** (0.0000341)	-0.000307*** (0.0000342)	-0.000245*** (0.0000358)	-0.000314*** (0.0000354)	-0.000468* (0.000225)	0.000734*** (0.000210)	-0.000520* (0.000220)	0.000729*** (0.000205)
Marital Status (Ref-Married)								
Single	-0.0471* (0.0212)	-0.0722** (0.0227)	-0.0437+ (0.0226)	-0.0649** (0.0237)	-0.271* (0.105)	0.123 (0.138)	-0.310** (0.109)	0.141 (0.130)
Widowed	--	--	--	--	-0.418 (0.257)	-0.126 (0.468)	-0.252 (0.261)	-0.140 (0.406)
Divorced, separated	--	--	--	--	-0.00171 (0.252)	0.0606 (0.222)	0.0118 (0.252)	0.122 (0.220)
Other	-0.0699+ (0.0376)	-0.0815* (0.0373)	-0.0438 (0.0367)	-0.0485 (0.0359)	-0.0669 (0.121)	-0.0919 (0.137)	-0.187 (0.134)	-0.0883 (0.131)

	India				South Africa			
	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)
Years of education	-0.0138** (0.00476)	-0.0134** (0.00476)	-0.0155** (0.00509)	-0.0156** (0.00501)	0.00845 (0.0302)	-0.000145 (0.0390)	0.0178 (0.0329)	0.00373 (0.0385)
Years of education squared	0.00125*** (0.000313)	0.00119*** (0.000313)	0.00150*** (0.000360)	0.00142*** (0.000348)	0.000152 (0.00227)	0.0000829 (0.00270)	-0.0000771 (0.00236)	-0.000441 (0.00265)
No. of children (0-14 years)	0.00289 (0.00454)	0.00211 (0.00456)	0.00434 (0.00461)	0.00382 (0.00461)	-0.0396 (0.0351)	-0.00360 (0.0377)	-0.0573 (0.0381)	-0.0193 (0.0375)
No. of teens (15-21 years)	-0.0355*** (0.00683)	-0.0359*** (0.00685)	-0.0314*** (0.00722)	-0.0311*** (0.00709)	-0.0711 (0.0460)	-0.0347 (0.0586)	-0.0508 (0.0485)	-0.0185 (0.0581)
No. of adults (22+ years)	-0.0344*** (0.00546)	-0.0360*** (0.00551)	-0.0308*** (0.00561)	-0.0333*** (0.00565)	0.00599 (0.0377)	0.0523 (0.0891)	0.0241 (0.0368)	0.0577 (0.0840)
No. of household assets	0.0352*** (0.00241)	0.0341*** (0.00240)	0.0223*** (0.00524)	0.0215*** (0.00479)	0.0464** (0.0153)	-0.00625 (0.0139)	0.0709** (0.0216)	0.0137 (0.0158)
Highest education of adult in household (years)	-0.00114 (0.00288)	-0.00137 (0.00289)	-0.00185 (0.00266)	-0.00180 (0.00264)	-0.0225 (0.0215)	-0.0193 (0.0264)	-0.0228 (0.0218)	-0.0149 (0.0246)
House is owned	-0.154*** (0.0321)	-0.152*** (0.0322)	-0.133*** (0.0321)	-0.127*** (0.0327)	-0.407*** (0.0935)	0.174 (0.124)	-0.515*** (0.115)	0.0981 (0.128)

	India				South Africa			
	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)
Self-employed	-0.441*** (0.0432)	-0.442*** (0.0432)	-0.437*** (0.0444)	-0.442*** (0.0433)	-0.114 (0.117)	-0.0628 (0.0664)	-0.0869 (0.135)	-0.0337 (0.0611)
Constant	7.042*** (0.0698)	6.959*** (0.0693)	7.002*** (0.0741)	6.905*** (0.0739)	7.110*** (0.463)	9.226*** (0.511)	7.435*** (0.496)	9.305*** (0.495)
Selection Ln(sigma)		-0.524*** (0.0153)		-0.523*** (0.0148)		0.195** (0.0732)		0.194** (0.0716)
Observations	21,914	31,935	21,370	31,600	999	1,965	999	2,011

Source: IHDS 2005 and NIDS 2008, authors' calculations

Notes: Standard errors in parentheses

Estimates are weighted to population levels

+ p<.10, * p<.05, ** p<.01, *** p<.001

Table A8. OLS and IV-2SLS models for the log of annual earnings amongst the employed, with and without sample selection corrections, women

	India				South Africa			
	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)
Household electricity access	0.00776 (0.0237)	-0.0697* (0.0294)	-0.0324 (0.0630)	-0.145* (0.0639)	0.372* (0.180)	0.116 (0.132)	0.206 (0.452)	-0.0619 (0.304)
Age (years)	0.00863* (0.00377)	0.0556*** (0.00887)	0.00712+ (0.00372)	0.0518*** (0.00834)	0.173*** (0.0268)	-0.170*** (0.0412)	0.174*** (0.0266)	-0.161*** (0.0407)
Age squared	-0.0000642 (0.0000456)	-0.000683*** (0.000111)	-0.0000457 (0.0000447)	-0.000635*** (0.000104)	-0.00198*** (0.000267)	0.00168*** (0.000403)	-0.00198*** (0.000268)	0.00159*** (0.000394)

	India				South Africa			
	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)
Marital Status (Ref-Married)								
Single	-0.0592 (0.0360)	-0.0404 (0.0419)	-0.0642+ (0.0380)	-0.0496 (0.0436)	-0.0390 (0.198)	-0.370 (0.232)	-0.0473 (0.204)	-0.347 (0.244)
Widowed	--	--	--	--	0.0484 (0.223)	-0.192 (0.258)	0.0396 (0.225)	-0.141 (0.256)
Divorced, separated	--	--	--	--	-0.0344 (0.370)	-0.745* (0.370)	-0.0248 (0.371)	-0.711+ (0.364)
Other	0.0802** (0.0253)	0.106*** (0.0274)	0.0786** (0.0252)	0.105*** (0.0269)	0.00426 (0.270)	-0.444 (0.363)	-0.0297 (0.295)	-0.432 (0.381)
Years of education	-0.0224** (0.00827)	-0.0567*** (0.00833)	-0.0203* (0.00843)	-0.0519*** (0.00859)	-0.124* (0.0560)	-0.0370 (0.0712)	-0.124* (0.0561)	-0.0187 (0.0678)
Years of education squared	0.00635*** (0.000863)	0.00745*** (0.000782)	0.00618*** (0.000880)	0.00715*** (0.000788)	0.0199*** (0.00372)	0.00557 (0.00467)	0.0200*** (0.00374)	0.00489 (0.00450)
No. of children (0-14 years)	0.000759 (0.00608)	-0.00712 (0.00673)	0.000428 (0.00667)	-0.00795 (0.00740)	-0.000457 (0.0450)	0.0588 (0.0622)	-0.00802 (0.0513)	0.0449 (0.0610)
No. of teens (15-21 years)	0.0173+ (0.00899)	0.00186 (0.0105)	0.0181+ (0.00971)	0.000389 (0.0109)	-0.262* (0.132)	-0.223 (0.188)	-0.259* (0.131)	-0.215 (0.183)

	India				South Africa			
	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)
No. of adults (22+ years)	0.00649 (0.00678)	-0.0355*** (0.0101)	0.00680 (0.00745)	-0.0324** (0.0107)	-0.196+ (0.109)	-0.0969 (0.175)	-0.189+ (0.108)	-0.0863 (0.172)
Hours worked/year	0.977*** (0.0189)	0.967*** (0.0179)	0.984*** (0.0198)	0.978*** (0.0184)	0.883*** (0.105)	0.472*** (0.0689)	0.890*** (0.103)	0.464*** (0.0691)
Self-employed	0.0553 (0.0472)	0.0268 (0.0502)	0.0594 (0.0484)	0.0373 (0.0498)	-0.000676 (0.170)	0.200 (0.153)	-0.00339 (0.169)	0.165 (0.156)
Constant	1.330*** (0.159)	0.478* (0.228)	1.333*** (0.163)	0.516* (0.219)	-1.563 (1.269)	11.95*** (1.565)	-1.527 (1.311)	11.79*** (1.619)
Selection Ln(sigma)		-0.539*** (0.0443)		-0.551*** (0.0435)		1.022*** (0.0700)		1.022*** (0.0688)
Observations	9,845	30,369	9,649	30,270	1,180	3,583	1,180	3,624

Source: IHDS 2005 and NIDS 2008, authors' calculations

Notes: Standard errors in parentheses

Estimates are weighted to population levels

+ p<.10, * p<.05, ** p<.01, *** p<.001

Table A9. OLS and IV-2SLS models for the log of annual hours worked amongst the employed, with and without sample selection corrections, women

	India				South Africa			
	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)
Household electricity access	0.0894** (0.0335)	0.0917** (0.0335)	0.619*** (0.118)	0.695*** (0.122)	0.00492 (0.102)	0.109 (0.0734)	0.0288 (0.217)	0.0344 (0.180)

	India				South Africa			
	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)
Age (years)	0.0191*** (0.00570)	0.0356*** (0.00591)	0.0251*** (0.00600)	0.0370*** (0.00540)	0.0393** (0.0150)	-0.131*** (0.0225)	0.0395** (0.0150)	-0.132*** (0.0233)
Age squared	-0.000259*** (0.0000678)	-0.000472*** (0.0000713)	-0.000316*** (0.0000717)	-0.000481*** (0.0000653)	-0.000478** (0.000163)	0.00136*** (0.000252)	-0.000480** (0.000164)	0.00135*** (0.000260)
Marital Status (Ref-Married)								
Single	-0.0381 (0.0504)	-0.0428 (0.0522)	-0.0126 (0.0498)	-0.0509 (0.0498)	0.221* (0.0977)	-0.0802 (0.132)	0.219* (0.0986)	-0.0550 (0.134)
Widowed	--	--	--	--	-0.212 (0.182)	-0.258 (0.210)	-0.212 (0.182)	-0.226 (0.206)
Divorced, separated	--	--	--	--	0.193 (0.131)	-0.229 (0.218)	0.191 (0.132)	-0.193 (0.220)
Other	0.159*** (0.0299)	0.164*** (0.0298)	0.136*** (0.0304)	0.143*** (0.0295)	0.318* (0.146)	0.0886 (0.206)	0.320* (0.149)	0.0957 (0.204)
Years of education	-0.00847 (0.00812)	-0.0182* (0.00837)	-0.0146+ (0.00835)	-0.0222** (0.00833)	0.00401 (0.0347)	0.0375 (0.0403)	0.00395 (0.0347)	0.0426 (0.0395)
Years of education squared	0.00306*** (0.000636)	0.00372*** (0.000664)	0.00430*** (0.000717)	0.00452*** (0.000673)	0.000303 (0.00228)	-0.00584* (0.00279)	0.000338 (0.00227)	-0.00642* (0.00278)

	India				South Africa			
	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)
No. of children (0-14 years)	-0.0411*** (0.00761)	-0.0451*** (0.00776)	-0.0331*** (0.00800)	-0.0353*** (0.00780)	-0.0737** (0.0248)	-0.0192 (0.0321)	-0.0729** (0.0253)	-0.0248 (0.0323)
No. of teens (15-21 years)	-0.0743*** (0.0141)	-0.0771*** (0.0141)	-0.0713*** (0.0147)	-0.0695*** (0.0131)	-0.0237 (0.0484)	-0.0624 (0.0693)	-0.0243 (0.0488)	-0.0579 (0.0668)
No. of adults (22+ years)	-0.00808 (0.0105)	-0.0168 (0.0106)	-0.00408 (0.0109)	-0.0106 (0.0102)	0.00595 (0.0180)	0.00991 (0.0525)	0.00537 (0.0190)	0.00889 (0.0494)
No. of household assets	0.0267*** (0.00444)	0.0201*** (0.00454)	-0.0119 (0.00953)	-0.0138+ (0.00777)	0.0380*** (0.0104)	-0.0251 (0.0169)	0.0367* (0.0141)	-0.0184 (0.0188)
Highest education of adult in household (years)	-0.0135*** (0.00327)	-0.0159*** (0.00334)	-0.0148*** (0.00338)	-0.0174*** (0.00319)	0.0274+ (0.0142)	0.0244 (0.0177)	0.0272+ (0.0142)	0.0275 (0.0174)
House is owned	-0.245*** (0.0384)	-0.244*** (0.0412)	-0.231*** (0.0435)	-0.178*** (0.0457)	-0.435*** (0.102)	-0.0199 (0.169)	-0.434*** (0.105)	-0.0290 (0.167)
Self-employed	-0.275** (0.0840)	-0.275** (0.0837)	-0.290*** (0.0875)	-0.285*** (0.0806)	0.109 (0.108)	0.145* (0.0666)	0.109 (0.108)	0.132+ (0.0680)
Constant	6.702*** (0.118)	6.395*** (0.126)	6.484*** (0.135)	6.175*** (0.125)	6.037*** (0.388)	11.62*** (0.666)	6.021*** (0.402)	11.60*** (0.691)

	India				South Africa			
	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)	(OLS)	(Heckman)	(IV-2SLS)	(Heckman IV-2SLS)
Selection Ln(sigma)		-0.406*** (0.0163)		-0.417*** (0.0166)		0.448*** (0.0509)		0.444*** (0.0514)
Observations	9,846	30,370	9,650	30,271	1,140	3,625	1,140	3,666

Source: IHDS 2005 and NIDS 2008, authors' calculations

Notes: Standard errors in parentheses

Estimates are weighted to population levels

+ p<.10, * p<.05, ** p<.01, *** p<.001

Appendix B: Propensity score matching estimations

Table B1. Results of the balancing test of covariates in the matched samples for percentage employed (full sample, India)

Covariate	Mean (Treated)	Nearest neighbour matching				Kernel matching				Radius matching			
		Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t
Age (years)	36.992	36.560	2.600	4.780	0.000	37.035	-0.300	-0.470	0.637	37.111	-0.700	-1.300	0.193
Education (years)	5.409	5.473	-1.500	-2.490	0.013	5.257	3.500	5.990	0.000	5.411	-0.100	-0.110	0.914
Married	0.237	0.245	-2.000	-3.550	0.000	0.236	0.300	0.540	0.591	0.236	0.400	0.680	0.499
Separated/divorced	0.075	0.067	2.900	5.570	0.000	0.076	-0.100	-0.260	0.795	0.075	0.100	0.230	0.819
Backward caste/minorities	0.727	0.724	0.700	1.200	0.230	0.738	-2.900	-4.700	0.000	0.724	0.700	1.200	0.232
Female	0.497	0.484	2.800	5.100	0.000	0.483	2.900	5.320	0.000	0.479	3.600	6.630	0.000

Source: IHDS 2005, authors' calculations

Notes: The standardized % bias is the percentage difference of the sample means in the treated and non-treated (full or matched) sub-samples as a percentage of the square root of the average of the sample variances in the treated and non-treated groups (Rosenbaum and Rubin, 1985).

Table B2. Results of the balancing test of covariates in the matched samples for annual wages (full sample, India)

Covariate	Mean (Treated)	Nearest neighbour matching				Kernel matching				Radius matching			
		Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t
Age (years)	36.114	35.913	1.60	1.630	0.104	36.002	0.900	0.890	0.373	35.935	1.400	1.420	0.154
Education (years)	4.924	4.930	-0.10	-0.130	0.899	4.776	3.500	3.260	0.001	4.922	0.100	0.050	0.958
Married	0.160	0.163	-0.80	-0.800	0.424	0.161	-0.400	-0.370	0.711	0.166	-1.800	-1.760	0.078
Separated/divorced	0.048	0.045	1.10	1.240	0.216	0.049	-0.700	-0.710	0.477	0.049	-0.700	-0.790	0.432
Backward caste/minorities	0.821	0.821	0.10	0.090	0.929	0.828	-1.900	-1.690	0.091	0.817	1.400	1.250	0.211
Female	0.303	0.305	-0.40	-0.460	0.647	0.306	-0.600	-0.660	0.511	0.300	0.700	0.690	0.491

Source: IHDS 2005, authors' calculations

Notes: The standardized % bias is the percentage difference of the sample means in the treated and non-treated (full or matched) sub-samples as a percentage of the square root of the average of the sample variances in the treated and non-treated groups (Rosenbaum and Rubin, 1985).

Table B3. Results of the balancing test of covariates in the matched samples for number of hours worked annually (full sample, India)

Covariate	Mean (Treated)	Nearest neighbour matching				Kernel matching				Radius matching			
		Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t
Age (years)	36.114	35.913	1.600	1.630	0.104	36.002	0.900	0.890	0.373	35.935	1.400	1.420	0.154
Education (years)	4.924	4.930	-0.100	-0.130	0.899	4.776	3.500	3.260	0.001	4.922	0.100	0.050	0.958
Married	0.160	0.163	-0.800	-0.800	0.424	0.161	-0.400	-0.370	0.711	0.166	-1.800	-1.760	0.078
Separated/divorced	0.048	0.045	1.100	1.240	0.216	0.049	-0.700	-0.710	0.477	0.049	-0.700	-0.790	0.432
Backward caste/minorities	0.821	0.821	0.100	0.090	0.929	0.828	-1.900	-1.690	0.091	0.817	1.400	1.250	0.211
Female	0.303	0.305	-0.400	-0.460	0.647	0.306	-0.600	-0.660	0.511	0.300	0.700	0.690	0.491

Source: IHDS 2005, authors' calculations

Notes: The standardized % bias is the percentage difference of the sample means in the treated and non-treated (full or matched) sub-samples as a percentage of the square root of the average of the sample variances in the treated and non-treated groups (Rosenbaum and Rubin, 1985).

Table B4. Results of the balancing test of covariates in the matched samples for percentage employed (males, India)

Covariate	Mean (Treated)	Nearest neighbour matching				Kernel matching				Radius matching			
		Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t
Age (years)	37.060	36.530	3.200	4.170	0.000	37.021	0.200	0.300	0.767	37.208	-0.900	-1.150	0.250
Education (years)	6.657	6.708	-1.200	-1.460	0.145	6.503	3.500	4.460	0.000	6.636	0.500	0.610	0.545
Married	0.297	0.304	-1.600	-2.070	0.039	0.294	0.500	0.630	0.527	0.292	1.100	1.370	0.171
Separated/divorced	0.032	0.029	2.000	2.930	0.003	0.034	-0.600	-0.800	0.423	0.033	-0.500	-0.720	0.470
Backward caste/minorities	0.729	0.729	0.100	0.150	0.883	0.744	-3.800	-4.340	0.000	0.730	-0.300	-0.330	0.744

Source: IHDS 2005, authors' calculations

Notes: The standardized % bias is the percentage difference of the sample means in the treated and non-treated (full or matched) sub-samples as a percentage of the square root of the average of the sample variances in the treated and non-treated groups (Rosenbaum and Rubin, 1985).

Table B5. Results of the balancing test of covariates in the matched samples for annual wages (males, India)

Covariate	Mean (Treated)	Nearest neighbour matching				Kernel matching				Radius matching			
		Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t
Age (years)	36.377	36.231	1.100	0.980	0.329	36.093	2.200	1.880	0.060	36.011	2.800	2.430	0.015
Education (years)	6.013	6.042	-0.700	-0.530	0.598	5.890	2.900	2.300	0.021	6.027	-0.300	-0.260	0.794
Married	0.186	0.196	-2.700	-2.230	0.026	0.188	-0.600	-0.530	0.593	0.190	-1.300	-1.070	0.284
Separated/divorced	0.018	0.014	2.200	2.280	0.023	0.018	-0.400	-0.360	0.722	0.019	-0.600	-0.570	0.566
Backward caste/minorities	0.799	0.804	-1.700	-1.240	0.216	0.807	-2.400	-1.770	0.077	0.795	1.000	0.710	0.476

Source: IHDS 2005, authors' calculations

Notes: The standardized % bias is the percentage difference of the sample means in the treated and non-treated (full or matched) sub-samples as a percentage of the square root of the average of the sample variances in the treated and non-treated groups (Rosenbaum and Rubin, 1985).

Table B6. Results of the balancing test of covariates in the matched samples for number of hours worked annually (males, India)

Covariate	Mean (Treated)	Nearest neighbour matching				Kernel matching				Radius matching			
		Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t
Age (years)	36.377	36.231	1.1	0.98	0.329	36.093	2.2	1.88	0.06	36.011	2.8	2.43	0.015
Education (years)	6.013	6.042	-0.7	-0.53	0.598	5.890	2.9	2.3	0.021	6.027	-0.3	-0.26	0.794
Married	0.186	0.196	-2.7	-2.23	0.026	0.188	-0.6	-0.53	0.593	0.190	-1.3	-1.07	0.284
Separated/divorced	0.018	0.014	2.2	2.28	0.023	0.018	-0.4	-0.36	0.722	0.019	-0.6	-0.57	0.566
Backward caste/minorities	0.799	0.804	-1.7	-1.24	0.216	0.807	-2.4	-1.77	0.077	0.795	1	0.71	0.476

Source: IHDS 2005, authors' calculations

Notes: The standardized % bias is the percentage difference of the sample means in the treated and non-treated (full or matched) sub-samples as a percentage of the square root of the average of the sample variances in the treated and non-treated groups (Rosenbaum and Rubin, 1985).

Table B7. Results of the balancing test of covariates in the matched samples for percentage employed (females, India)

Covariate	Mean (Treated)	Nearest neighbour matching				Kernel matching				Radius matching			
		Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t
Age (years)	36.909	36.429	2.900	3.780	0.000	36.801	0.700	0.830	0.405	36.702	1.300	1.600	0.110
Education (years)	4.144	4.173	-0.700	-0.850	0.396	3.952	4.900	5.630	0.000	4.130	0.400	0.400	0.687
Married	0.177	0.181	-1.100	-1.350	0.178	0.174	0.900	1.190	0.235	0.179	-0.500	-0.600	0.552
Separated/divorced	0.119	0.106	3.700	4.960	0.000	0.118	0.100	0.110	0.916	0.117	0.600	0.730	0.466
Backward caste/minorities	0.724	0.720	1.100	1.270	0.206	0.733	-2.200	-2.440	0.015	0.720	1.100	1.180	0.236

Source: IHDS 2005, authors' calculations

Notes: The standardized % bias is the percentage difference of the sample means in the treated and non-treated (full or matched) sub-samples as a percentage of the square root of the average of the sample variances in the treated and non-treated groups (Rosenbaum and Rubin, 1985).

Table B8. Results of the balancing test of covariates in the matched samples for annual wages (females, India)

Covariate	Mean (Treated)	Nearest neighbour matching				Kernel matching				Radius matching			
		Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t
Age (years)	35.515	35.636	-1.000	-0.550	0.585	35.489	0.200	0.120	0.908	35.582	-0.500	-0.300	0.762
Education (years)	2.364	2.330	1.000	0.530	0.599	2.215	4.500	2.290	0.022	2.316	1.500	0.730	0.464
Married	0.099	0.089	3.400	1.920	0.054	0.095	1.400	0.790	0.429	0.098	0.600	0.310	0.759
Separated/divorced	0.115	0.113	0.600	0.340	0.736	0.116	-0.400	-0.230	0.815	0.116	-0.200	-0.120	0.906
Backward caste/minorities	0.878	0.876	0.500	0.240	0.807	0.876	0.600	0.300	0.768	0.869	3.000	1.470	0.141

Source: IHDS 2005, authors' calculations

Notes: The standardized % bias is the percentage difference of the sample means in the treated and non-treated (full or matched) sub-samples as a percentage of the square root of the average of the sample variances in the treated and non-treated groups (Rosenbaum and Rubin, 1985).

Table B9. Results of the balancing test of covariates in the matched samples for number of hours worked annually (females, India)

Covariate	Mean (Treated)	Nearest neighbour matching				Kernel matching				Radius matching			
		Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t
Age (years)	35.515	35.636	-1.000	-0.550	0.585	35.489	0.200	0.120	0.908	35.582	-0.500	-0.300	0.762
Education (years)	2.364	2.330	1.000	0.530	0.599	2.215	4.500	2.290	0.022	2.316	1.500	0.730	0.464
Married	0.099	0.089	3.400	1.920	0.054	0.095	1.400	0.790	0.429	0.098	0.600	0.310	0.759
Separated/divorced	0.115	0.113	0.600	0.340	0.736	0.116	-0.400	-0.230	0.815	0.116	-0.200	-0.120	0.906
Backward caste/minorities	0.878	0.876	0.500	0.240	0.807	0.876	0.600	0.300	0.768	0.869	3.000	1.470	0.141

Source: IHDS 2005, authors' calculations

Notes: The standardized % bias is the percentage difference of the sample means in the treated and non-treated (full or matched) sub-samples as a percentage of the square root of the average of the sample variances in the treated and non-treated groups (Rosenbaum and Rubin, 1985).

Table B10. Results of the balancing test of covariates in the matched samples for percentage employed (full sample, South Africa)

Covariate	Mean (Treated)	Nearest neighbour matching				Kernel matching				Radius matching			
		Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t
Age (years)	37.235	37.117	0.6	0.32	0.752	37.694	-2.4	-1.22	0.221	37.845	-3.2	-1.63	0.103
Education (years)	7.348	7.259	2.1	1.04	0.299	7.164	4.3	2.20	0.028	7.182	3.9	1.98	0.047
Single	0.551	0.554	-0.4	-0.20	0.839	0.548	0.6	0.31	0.756	0.538	2.6	1.28	0.202
Widowed	0.093	0.094	-0.5	-0.28	0.781	0.098	-1.6	-0.83	0.404	0.098	-1.5	-0.79	0.429
Separated/ divorced	0.018	0.017	1.1	0.54	0.589	0.020	-1.5	-0.71	0.480	0.020	-1.7	-0.77	0.441
Other marital status	0.076	0.069	2.3	1.25	0.212	0.080	-1.5	-0.76	0.449	0.082	-2.4	-1.21	0.228
African race group	0.914	0.904	4.2	1.79	0.073	0.914	0.1	0.02	0.981	0.901	5.4	2.29	0.022
Female	0.604	0.594	2.1	1.03	0.302	0.606	-0.4	-0.22	0.827	0.601	0.7	0.33	0.741

Source: NIDS 2008, authors' calculations

Notes: The standardized % bias is the percentage difference of the sample means in the treated and non-treated (full or matched) sub-samples as a percentage of the square root of the average of the sample variances in the treated and non-treated groups (Rosenbaum and Rubin, 1985).

Table B11. Results of the balancing test of covariates in the matched samples for annual wages (full sample, South Africa)

Covariate	Mean (Treated)	Nearest neighbour matching				Kernel matching				Radius matching			
		Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t
Age (years)	39.048	39.095	-0.3	-0.09	0.927	39.363	-2.1	-0.60	0.551	39.505	-3.1	-0.86	0.387
Education (years)	7.669	7.742	-1.7	-0.47	0.641	7.463	4.8	1.34	0.179	7.434	4.7	1.31	0.190
Single	0.440	0.460	-4.2	-1.15	0.252	0.438	0.2	0.05	0.961	0.433	2.3	0.61	0.542
Widowed	0.064	0.057	2.5	0.77	0.440	0.061	1.1	0.32	0.749	0.060	1.5	0.46	0.645
Separated/ divorced	0.0265	0.016	6.7	1.91	0.056	0.021	3.5	0.96	0.337	0.021	3.7	1.00	0.319
Other marital status	0.116	0.100	4.6	1.36	0.173	0.124	-2.5	-0.70	0.483	0.126	-2.6	-0.73	0.467
African race group	0.846	0.859	-4.3	-1.04	0.300	0.845	0.2	0.04	0.965	0.842	4.5	1.07	0.285
Female	0.509	0.497	2.4	0.66	0.508	0.493	3.2	0.86	0.390	0.487	5.2	1.40	0.162

Source: NIDS 2008, authors' calculations

Notes: The standardized % bias is the percentage difference of the sample means in the treated and non-treated (full or matched) sub-samples as a percentage of the square root of the average of the sample variances in the treated and non-treated groups (Rosenbaum and Rubin, 1985).

Table B12. Results of the balancing test of covariates in the matched samples for number of hours worked annually (full sample, South Africa)

Covariate	Mean (Treated)	Nearest neighbour matching				Kernel matching				Radius matching			
		Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t
Age (years)	39.084	38.544	3.6	1.05	0.295	39.668	-3.9	-1.12	0.264	39.748	-4.5	-1.28	0.201
Education (years)	7.707	7.659	1.1	0.31	0.755	7.486	5.1	1.48	0.140	7.509	4.2	1.20	0.231
Single	0.439	0.441	-0.4	-0.11	0.913	0.435	0.8	0.23	0.820	0.428	2.8	0.76	0.446
Widowed	0.064	0.060	1.7	0.52	0.601	0.070	-2.0	-0.60	0.546	0.066	-0.5	-0.14	0.892
Separated/ divorced	0.026	0.017	6.1	1.74	0.082	0.020	3.7	1.02	0.308	0.021	3.7	1.02	0.307
Other marital status	0.112	0.125	-3.9	-1.11	0.266	0.120	-2.1	-0.62	0.533	0.120	-2.1	-0.60	0.551
African race group	0.844	0.837	2.2	0.54	0.588	0.843	0.3	0.07	0.942	0.838	3.5	0.86	0.391
Female	0.510	0.453	11.5	3.18	0.001	0.501	1.8	0.50	0.616	0.496	3.5	0.97	0.330

Source: NIDS 2008, authors' calculations

Notes: The standardized % bias is the percentage difference of the sample means in the treated and non-treated (full or matched) sub-samples as a percentage of the square root of the average of the sample variances in the treated and non-treated groups (Rosenbaum and Rubin, 1985).

Table B13. Results of the balancing test of covariates in the matched samples for percentage employed (males, South Africa)

Covariate	Mean (Treated)	Nearest neighbour matching				Kernel matching				Radius matching			
		Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t
Age (years)	34.763	34.164	3.3	1.05	0.293	35.578	-4.5	-1.41	0.158	35.271	-3.2	-1.00	0.319
Education (years)	7.637	7.699	-1.5	-0.48	0.628	7.423	5.3	1.71	0.087	7.507	2.9	0.91	0.361
Single	0.610	0.645	-7.2	-2.26	0.024	0.599	2.3	0.72	0.474	0.600	2.5	0.79	0.429
Widowed	0.023	0.012	7.3	2.55	0.011	0.022	0.8	0.23	0.814	0.021	1.4	0.44	0.660
Separated/ divorced	0.016	0.017	-0.4	-0.13	0.899	0.017	-1.1	-0.33	0.744	0.018	-2.0	-0.59	0.554
Other marital status	0.081	0.063	6.1	2.17	0.030	0.091	-3.2	-1.04	0.300	0.090	-2.9	-0.97	0.334
African race group	0.910	0.909	0.2	0.06	0.955	0.908	0.6	0.16	0.872	0.899	5.5	1.56	0.119

Source: NIDS 2008, authors' calculations

Notes: The standardized % bias is the percentage difference of the sample means in the treated and non-treated (full or matched) sub-samples as a percentage of the square root of the average of the sample variances in the treated and non-treated groups (Rosenbaum and Rubin, 1985).

Table B14. Results of the balancing test of covariates in the matched samples for annual wages (males, South Africa)

Covariate	Mean (Treated)	Nearest neighbour matching				Kernel matching				Radius matching			
		Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t
Age (years)	37.783	37.148	4.2	0.87	0.383	38.137	-2.3	-0.47	0.641	38.508	-5.8	-1.16	0.248
Education (years)	7.754	7.853	-2.4	-0.47	0.640	7.516	5.7	1.15	0.252	7.569	3.1	0.60	0.549
Single	0.444	0.468	-5.0	-0.95	0.344	0.417	5.3	1.02	0.309	0.425	5.3	1.01	0.311
Widowed	0.022	0.014	5.9	1.19	0.235	0.019	2.0	0.37	0.710	0.019	2.5	0.46	0.647
Separated/ divorced	0.021	0.018	2.1	0.38	0.703	0.016	3.3	0.63	0.531	0.024	-3.5	-0.61	0.545
Other marital status	0.139	0.120	5.1	1.09	0.274	0.139	-0.1	-0.03	0.980	0.109	8.7	1.86	0.063
African race group	0.830	0.841	-3.1	-0.56	0.572	0.841	-3.2	-0.58	0.563	0.870	-8.6	-1.61	0.107

Source: NIDS 2008, authors' calculations

Notes: The standardized % bias is the percentage difference of the sample means in the treated and non-treated (full or matched) sub-samples as a percentage of the square root of the average of the sample variances in the treated and non-treated groups (Rosenbaum and Rubin, 1985).

Table B15. Results of the balancing test of covariates in the matched samples for number of hours worked annually (full sample, South Africa)

Covariate	Mean (Treated)	Nearest neighbour matching				Kernel matching				Radius matching			
		Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t
Age (years)	37.609	37.65	-0.3	-0.06	0.952	38.543	-6.1	-1.24	0.215	38.552	-6.5	-1.33	0.182
Education (years)	7.778	7.798	-0.5	-0.09	0.925	7.479	7.2	1.47	0.142	7.646	2.8	0.56	0.577
Single	0.443	0.439	0.8	0.16	0.876	0.413	6.0	1.17	0.242	0.391	10.9	2.13	0.033
Widowed	0.023	0.013	6.7	1.36	0.174	0.020	2.1	0.40	0.689	0.015	5.3	1.03	0.302
Separated/ divorced	0.021	0.003	13.9	3.33	0.001	0.016	3.6	0.68	0.494	0.020	1.3	0.24	0.810
Other marital status	0.136	0.122	3.6	0.77	0.442	0.133	0.7	0.14	0.891	0.138	-0.5	-0.10	0.920
African race group	0.831	0.856	-7.1	-1.35	0.177	0.836	-1.3	-0.23	0.818	0.866	-8.5	-1.64	0.102

Source: NIDS 2008, authors' calculations

Notes: The standardized % bias is the percentage difference of the sample means in the treated and non-treated (full or matched) sub-samples as a percentage of the square root of the average of the sample variances in the treated and non-treated groups (Rosenbaum and Rubin, 1985).

Table B16. Results of the balancing test of covariates in the matched samples for percentage employed (females, South Africa)

Covariate	Mean (Treated)	Nearest neighbour matching				Kernel matching				Radius matching			
		Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t
Age (years)	38.830	38.179	3.4	1.33	0.183	39.118	-1.5	-0.59	0.555	39.303	-2.5	-0.99	0.325
Education (years)	7.136	7.132	0.1	0.04	0.971	6.990	3.3	1.31	0.189	6.974	3.6	1.42	0.156
Single	0.514	0.520	-1.1	-0.42	0.676	0.516	-0.4	-0.15	0.877	0.506	1.7	0.66	0.511
Widowed	0.138	0.138	0.1	0.04	0.970	0.144	-1.6	-0.65	0.513	0.149	-2.9	-1.16	0.247
Separated/ divorced	0.020	0.019	0.5	0.19	0.850	0.022	-1.8	-0.63	0.530	0.024	-3.3	-1.13	0.257
Other marital status	0.072	0.083	-4.0	-1.56	0.119	0.076	-1.2	-0.49	0.624	0.077	-1.6	-0.63	0.525
African race group	0.921	0.910	4.7	1.54	0.123	0.923	-1.1	-0.37	0.708	0.910	5.1	1.67	0.094

Source: NIDS 2008, authors' calculations

Notes: The standardized % bias is the percentage difference of the sample means in the treated and non-treated (full or matched) sub-samples as a percentage of the square root of the average of the sample variances in the treated and non-treated groups (Rosenbaum and Rubin, 1985).

Table B17. Results of the balancing test of covariates in the matched samples for annual wages (females, South Africa)

Covariate	Mean (Treated)	Nearest neighbour matching				Kernel matching				Radius matching			
		Mean (Control)	% Bias	t	u p>t	Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t
Age (years)	40.537	40.313	1.6	0.29	0.769	40.518	0.1	0.03	0.980	40.689	-1.1	-0.20	0.839
Education (years)	7.431	7.523	-2.1	-0.40	0.690	7.369	1.4	0.27	0.787	7.401	0.7	0.13	0.896
Single	0.451	0.444	1.4	0.27	0.791	0.444	1.4	0.27	0.790	0.420	6.1	1.17	0.244
Widowed	0.107	0.117	-2.9	-0.59	0.559	0.108	-0.4	-0.07	0.942	0.113	-1.8	-0.36	0.719
Separated/ divorced	0.031	0.017	8.4	1.74	0.083	0.026	2.9	0.55	0.582	0.026	2.6	0.49	0.623
Other marital status	0.096	0.111	-5.0	-0.95	0.342	0.109	-4.1	-0.80	0.425	0.117	-6.8	-1.29	0.198
African race group	0.901	0.901	0.0	0.00	1.000	0.905	-1.4	-0.26	0.792	0.900	0.5	0.09	0.929

Source: NIDS 2008, authors' calculations

Notes: The standardized % bias is the percentage difference of the sample means in the treated and non-treated (full or matched) sub-samples as a percentage of the square root of the average of the sample variances in the treated and non-treated groups (Rosenbaum and Rubin, 1985).

Table B18. Results of the balancing test of covariates in the matched samples for number of hours worked annually (females, South Africa)

Covariate	Mean (Treated)	Nearest neighbour matching				Kernel matching				Radius matching			
		Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t	Mean (Control)	% Bias	t	p>t
Age (years)	40.409	40.488	-0.6	-0.11	0.909	40.541	-0.9	-0.18	0.855	40.543	-0.5	-0.10	0.922
Education (years)	7.510	7.552	-0.9	-0.19	0.852	7.460	1.1	0.23	0.821	7.466	-0.1	-0.02	0.986
Single	0.445	0.432	2.6	0.51	0.607	0.445	0.0	0.00	0.998	0.426	5.1	0.98	0.325
Widowed	0.106	0.117	-3.5	-0.73	0.466	0.114	-2.5	-0.51	0.608	0.118	-3.0	-0.61	0.541
Separated/ divorced	0.030	0.034	-2.4	-0.44	0.663	0.024	3.5	0.69	0.487	0.025	2.7	0.53	0.596
Other marital status	0.093	0.101	-2.6	-0.52	0.604	0.110	-5.6	-1.09	0.274	0.114	-6.5	-1.25	0.213
African race group	0.881	0.884	-0.9	-0.16	0.874	0.886	-1.7	-0.30	0.768	0.896	0.5	0.08	0.933

Source: NIDS 2008, authors' calculations

Notes: The standardized % bias is the percentage difference of the sample means in the treated and non-treated (full or matched) sub-samples as a percentage of the square root of the average of the sample variances in the treated and non-treated groups (Rosenbaum and Rubin, 1985).

Figure B1: Propensity scores before and after matching (outcome: employment), India

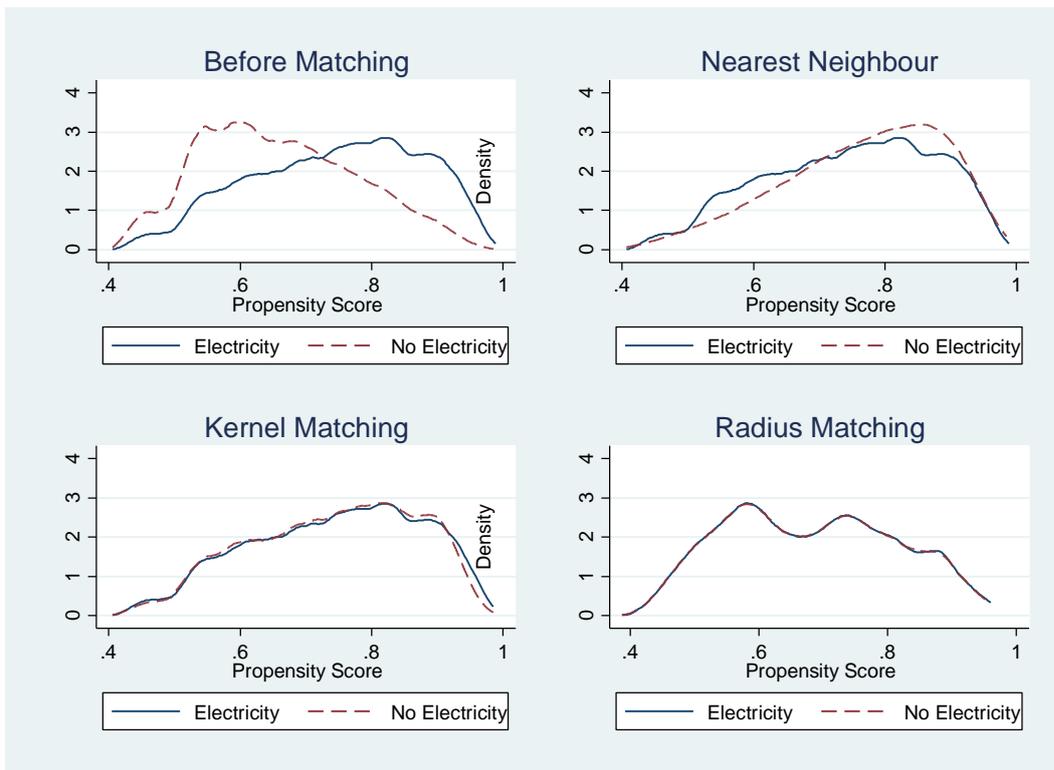


Figure B2: Propensity scores before and after matching (outcome: annual wages), India

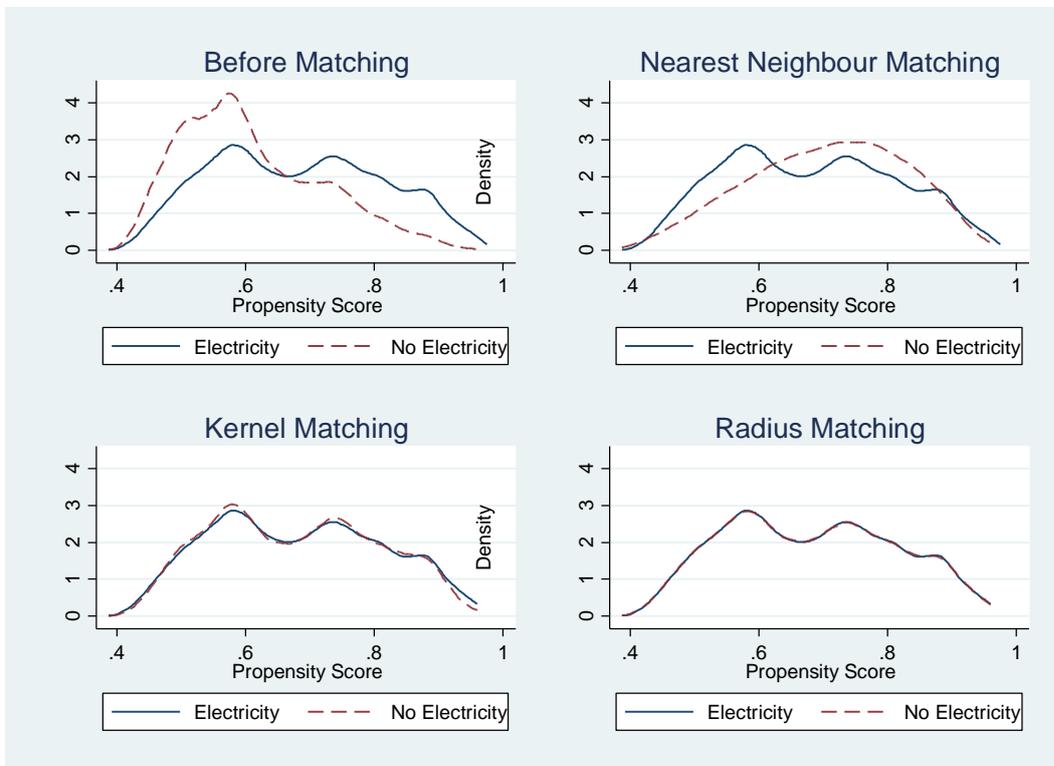


Figure B3: Propensity scores before and after matching (outcome: annual hours worked), India

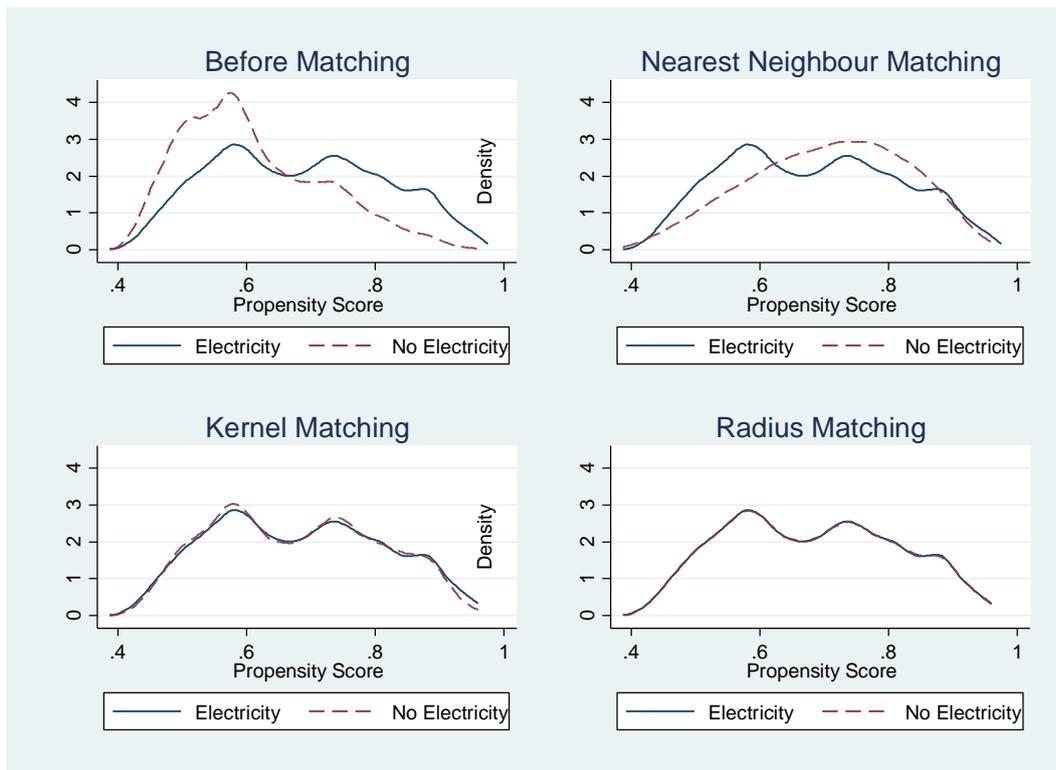


Figure B4: Propensity scores before and after matching (outcome: employment), India males

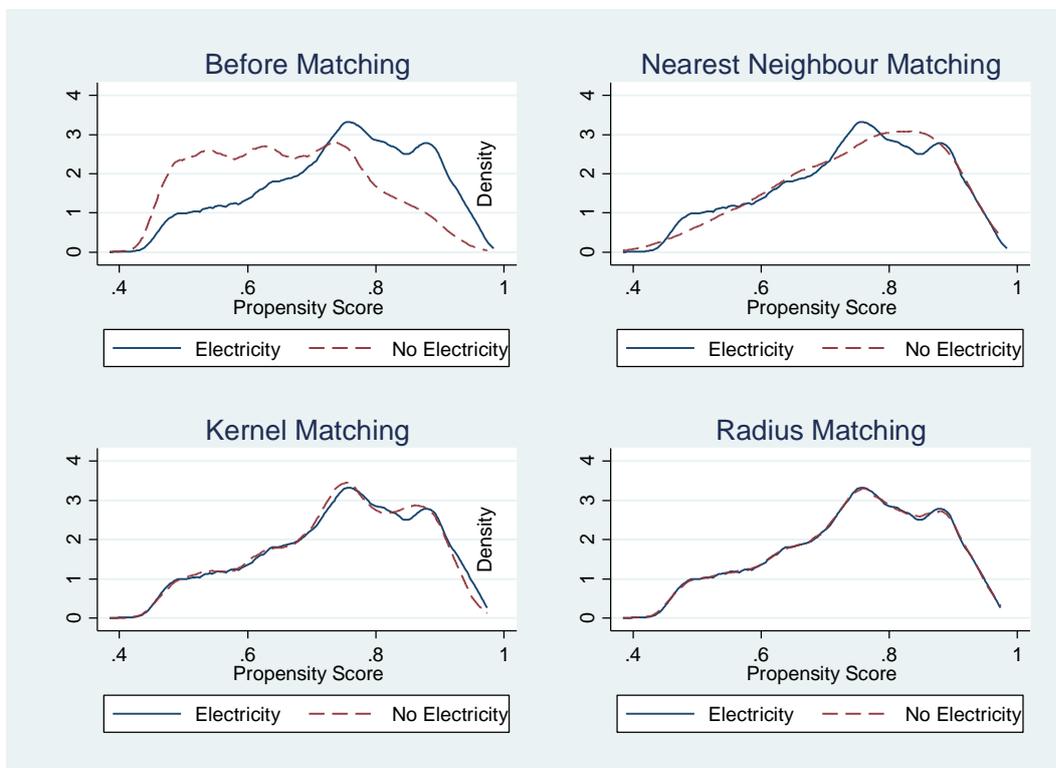


Figure B5: Propensity scores before and after matching (outcome: annual wages), India males

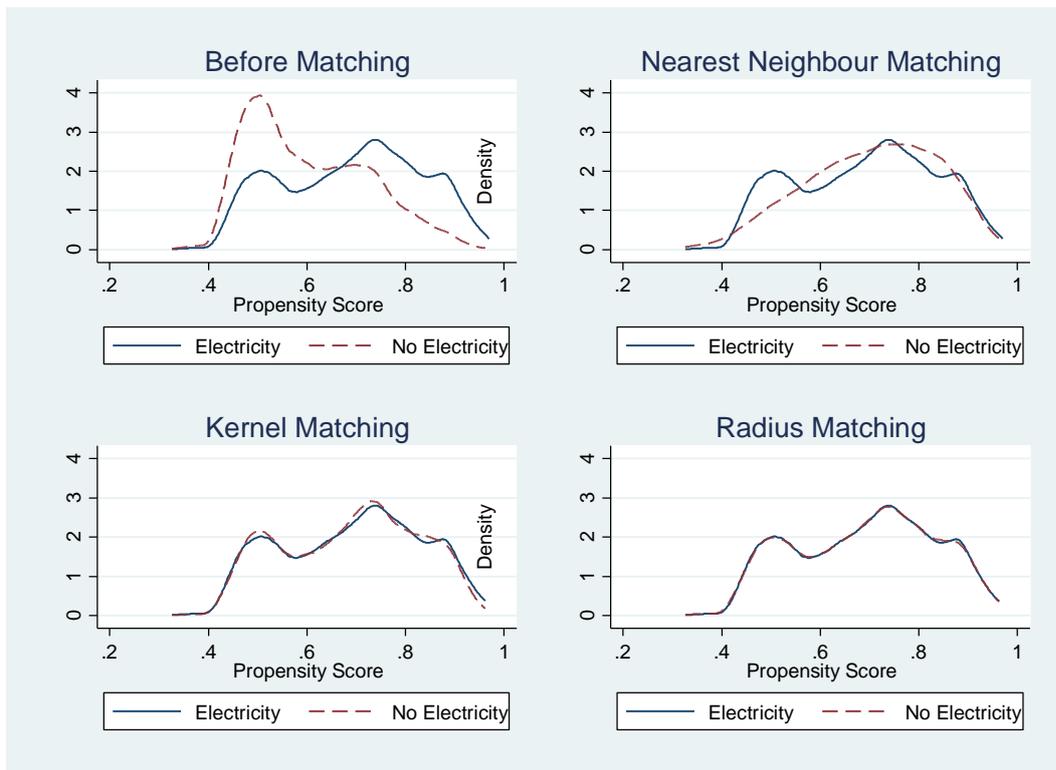


Figure B6: Propensity scores before and after matching (outcome: annual hours worked), India males

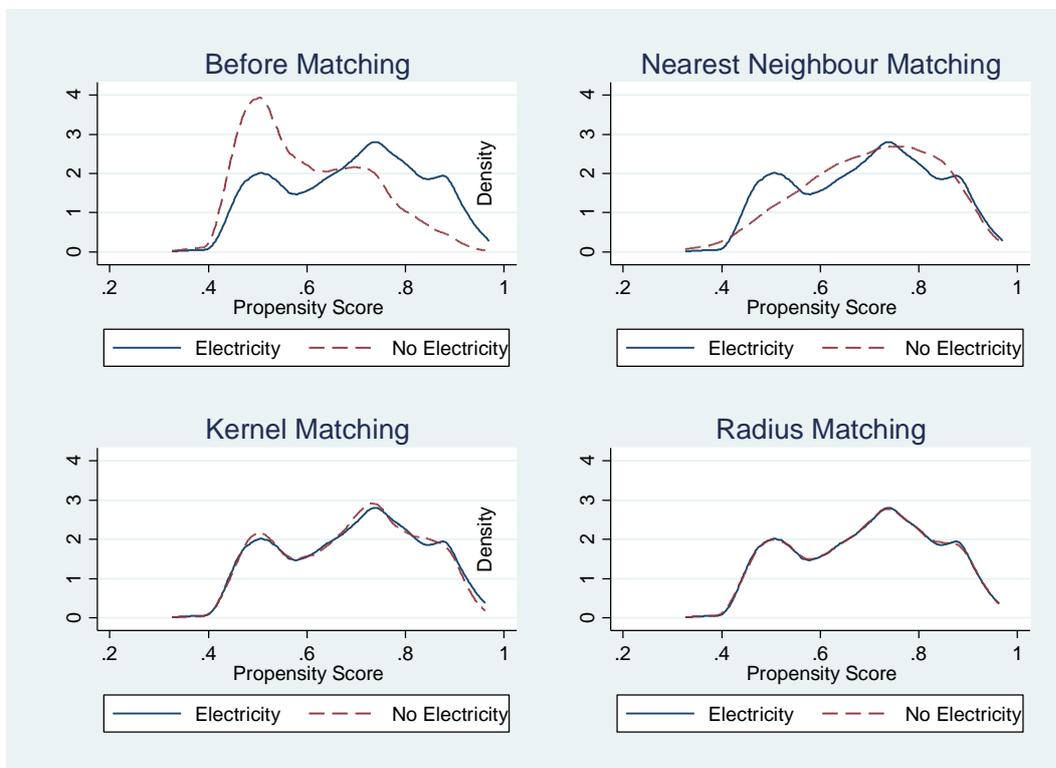


Figure B7: Propensity scores before and after matching (outcome: employment), India females

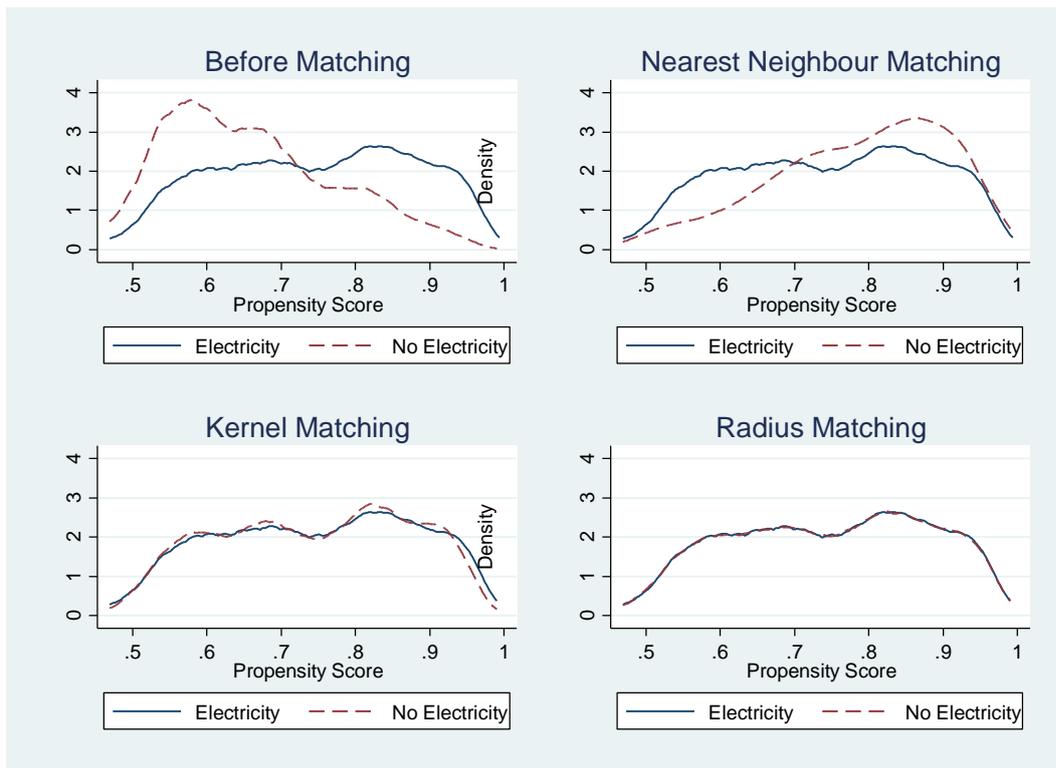


Figure B8: Propensity scores before and after matching (outcome: annual wages), India females

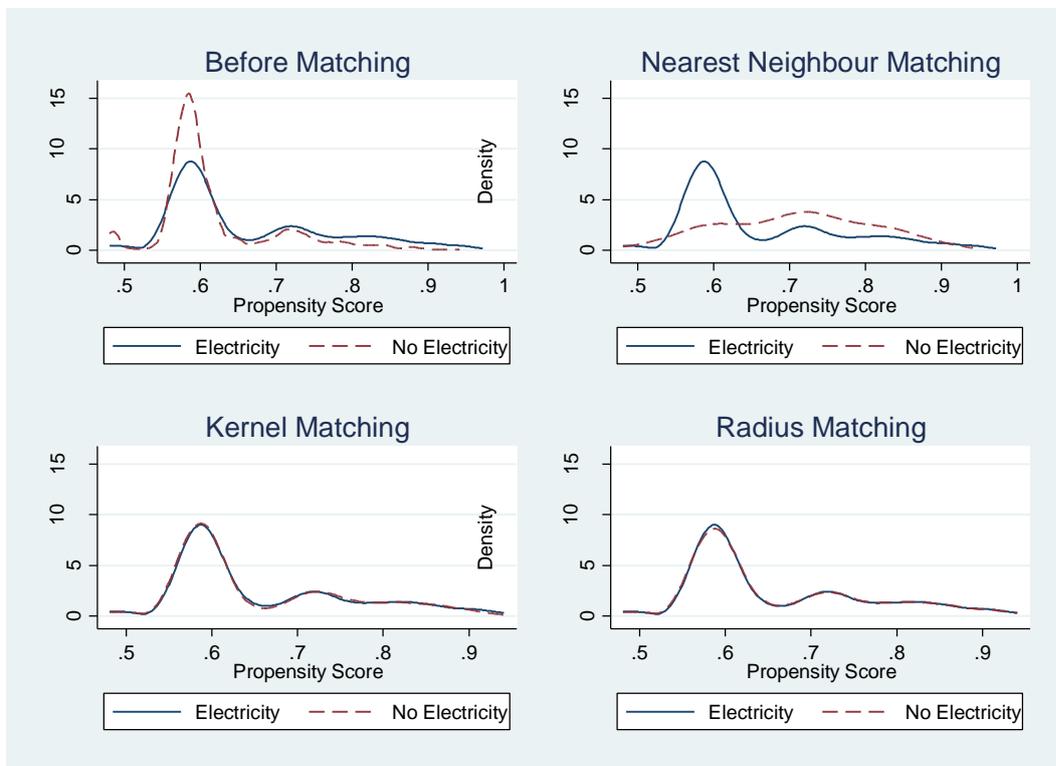


Figure B9: Propensity scores before and after matching (outcome: annual hours worked), India

females

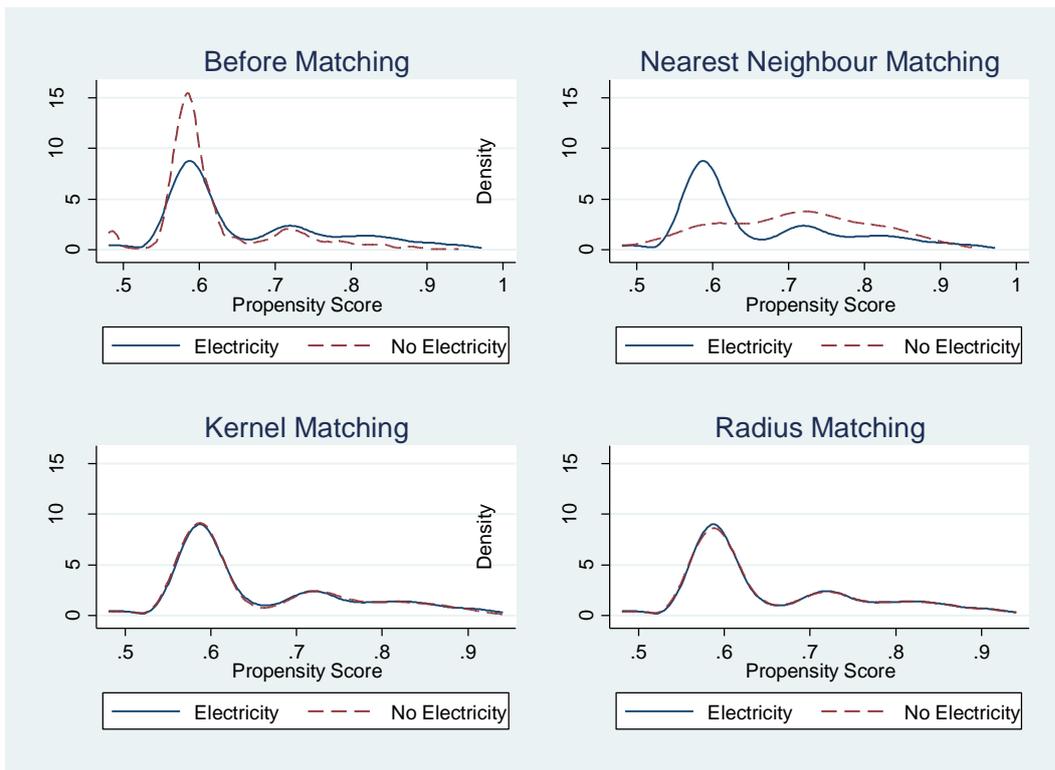


Figure B10: Propensity scores before and after matching (outcome: employment), South Africa

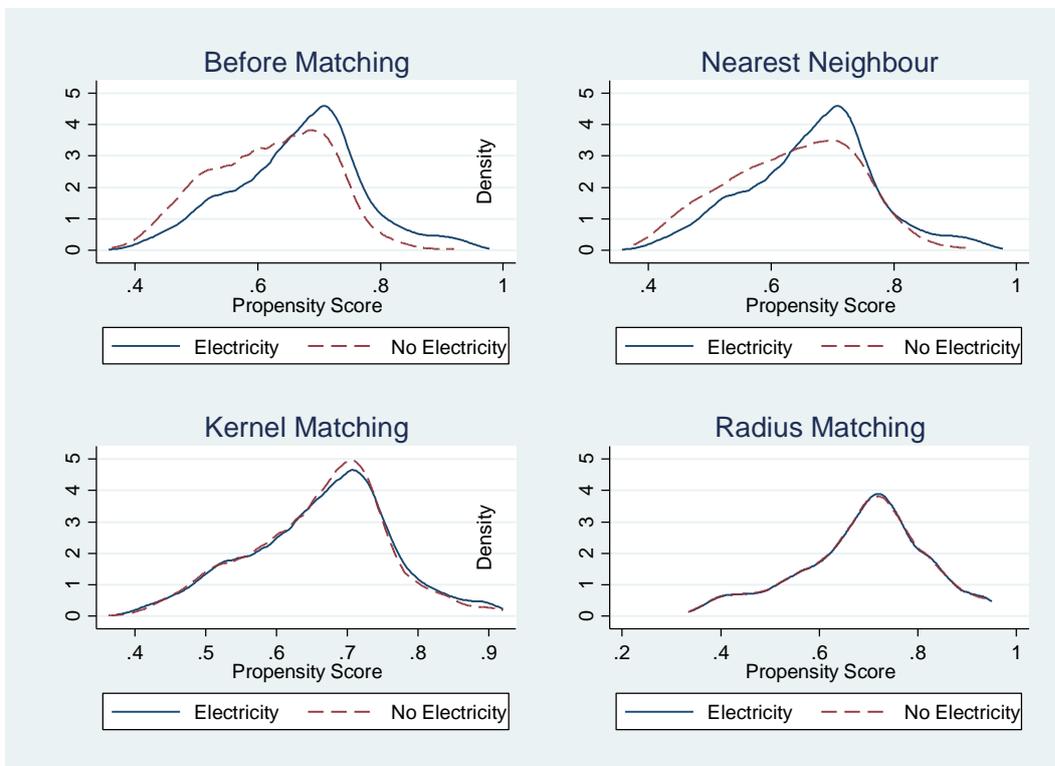


Figure B11: Propensity scores before and after matching (outcome: annual wages), South Africa

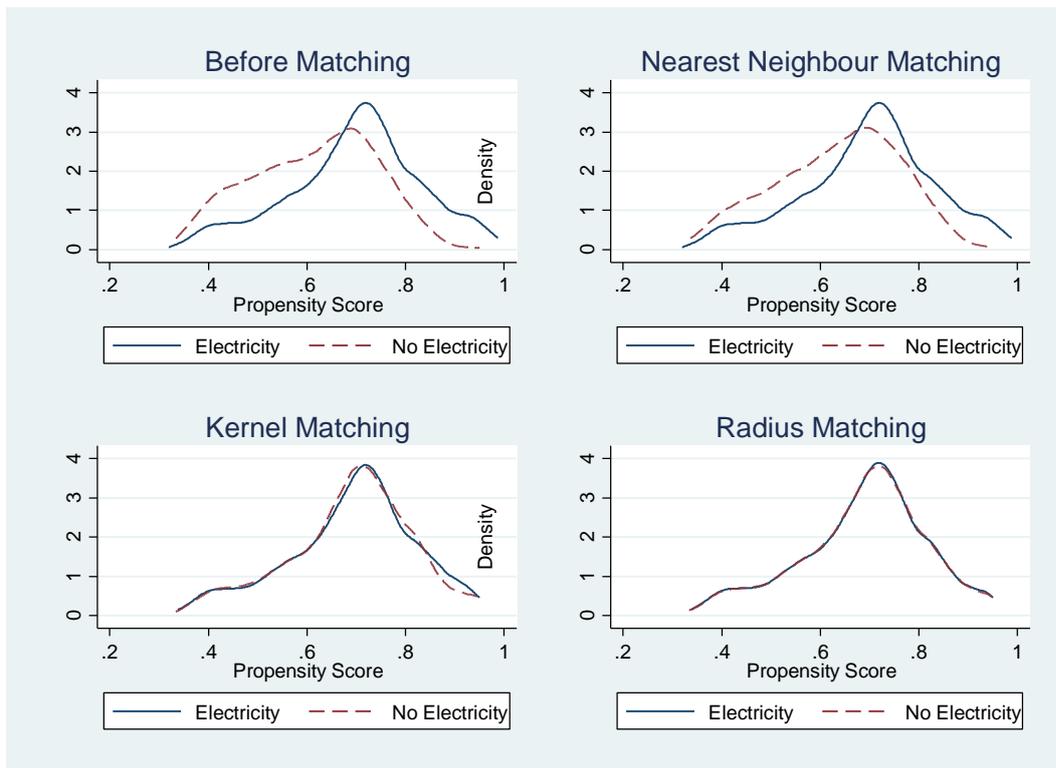


Figure B12: Propensity scores before and after matching (outcome: annual hours worked), South Africa

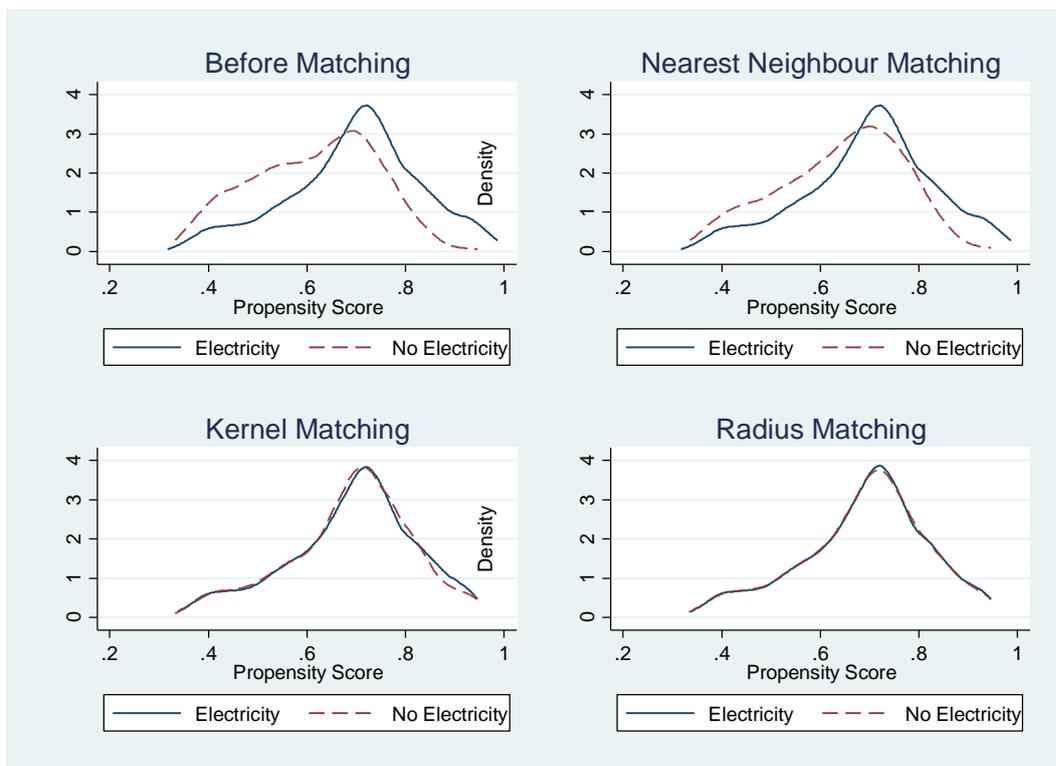


Figure B13: Propensity scores before and after matching (outcome: employment), South Africa males

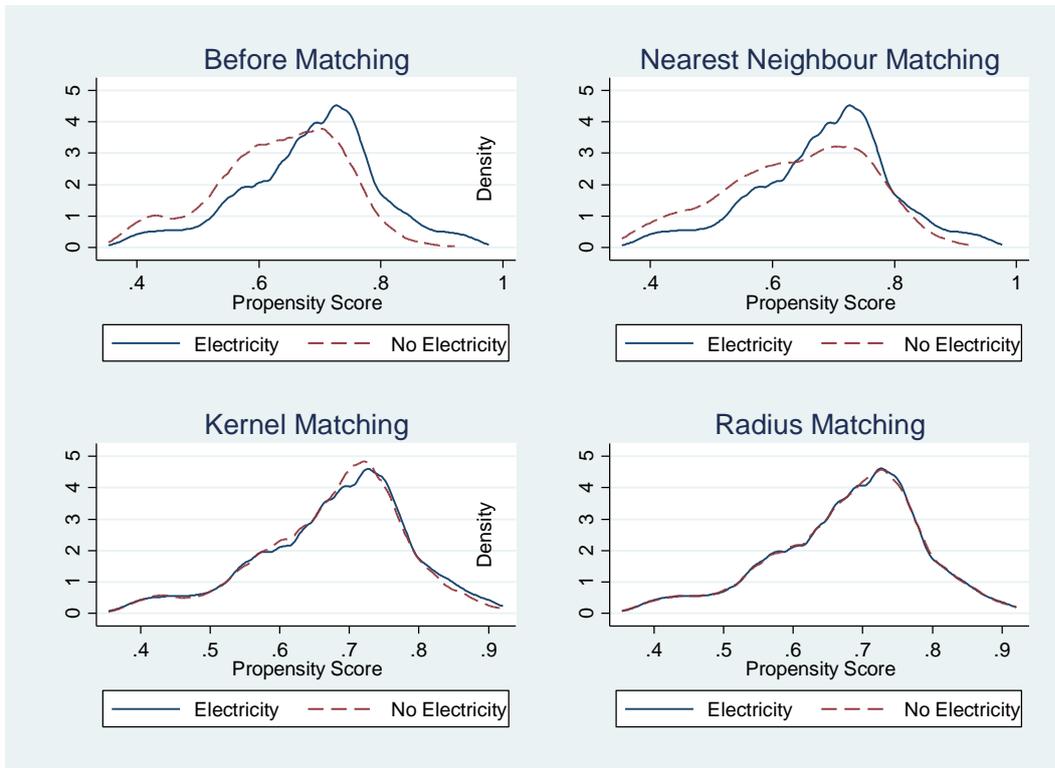


Figure B14: Propensity scores before and after matching (outcome: annual wages), South Africa males

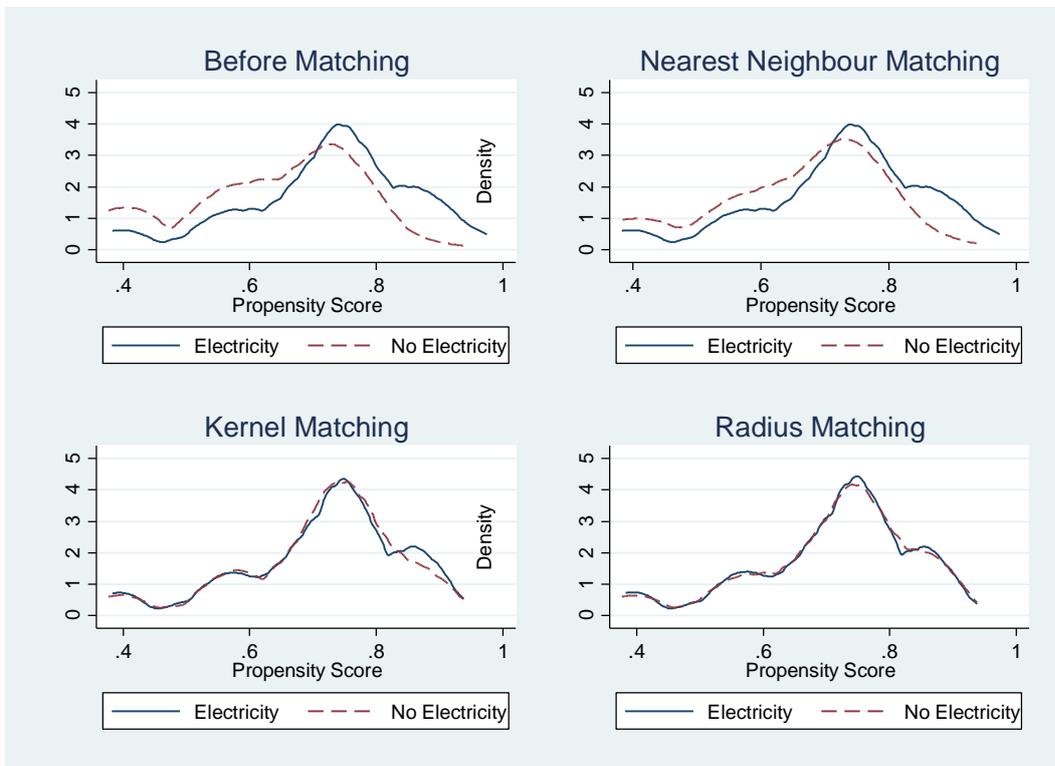


Figure B15: Propensity scores before and after matching (outcome: annual hours worked), South Africa males

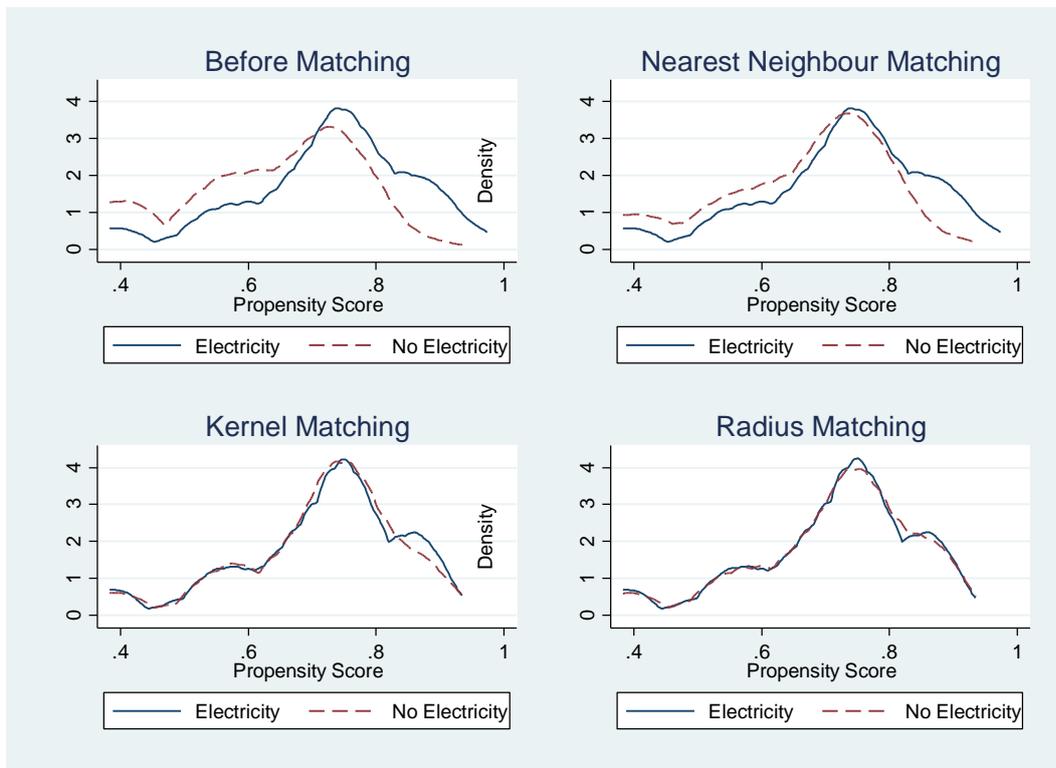


Figure B16: Propensity scores before and after matching (outcome: employment), South Africa females

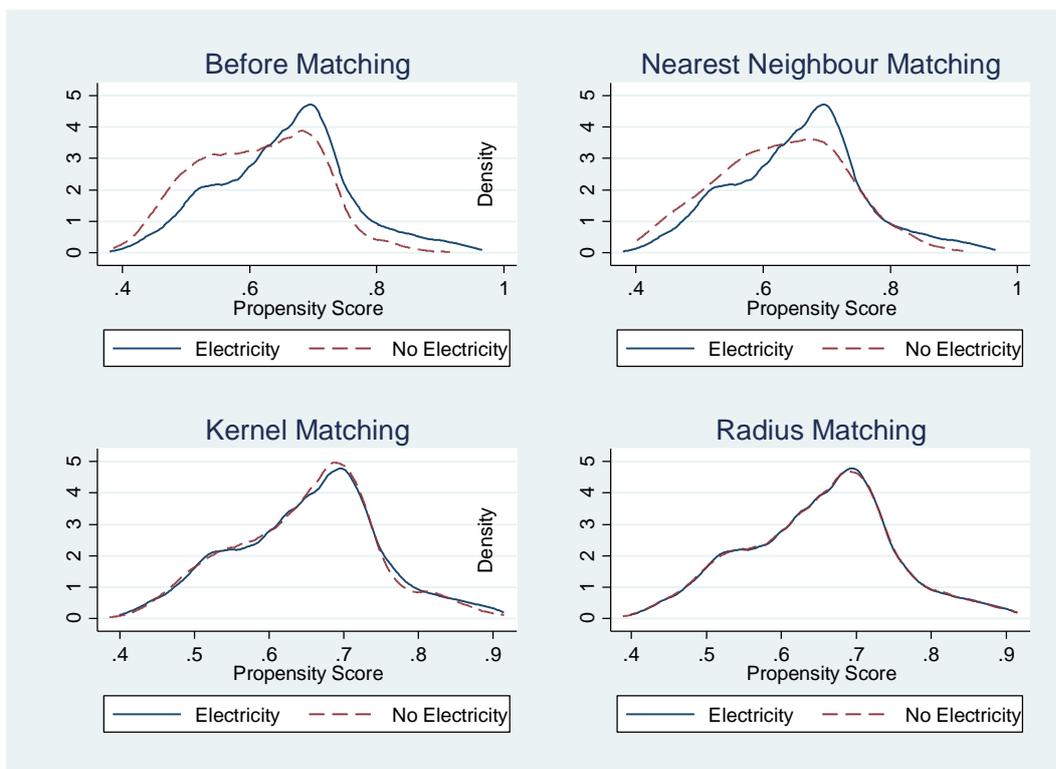


Figure B17: Propensity scores before and after matching (outcome: annual wages), South Africa females

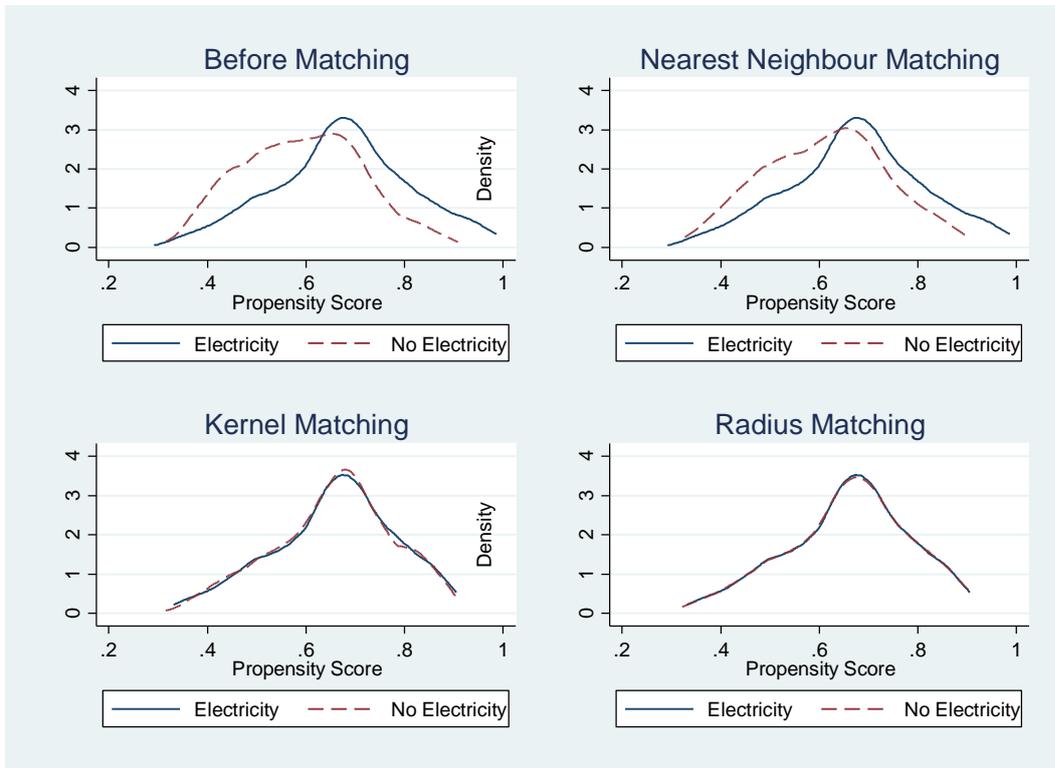
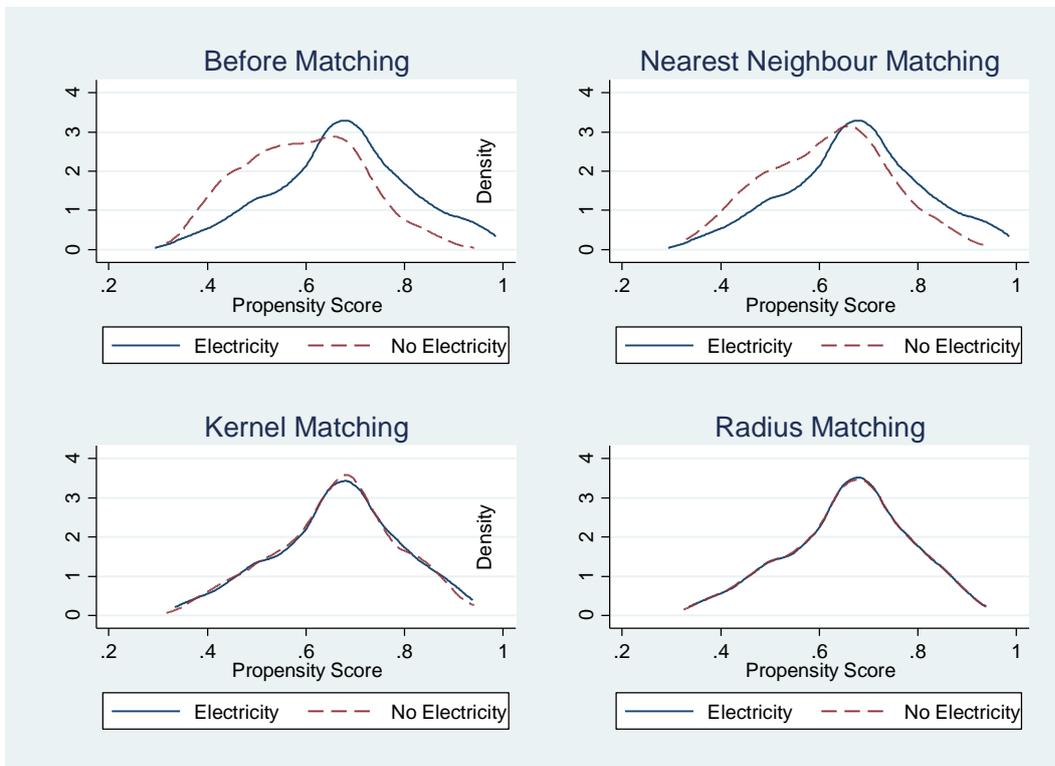


Figure B18: Propensity scores before and after matching (outcome: annual hours worked), South Africa females



Appendix C: Panel estimations

Table C1. Tests for selective attrition (full sample)

	Employment		Log of annual earnings		Log of hours worked	
	Attrition probit	BGLW test	Attrition probit	BGLW test	Attrition probit	BGLW test
India						
<i>Without weights</i>						
Outcome variable	-0.313*** (0.0216)		0.0900* (0.0392)		0.0634*** (0.0162)	
Probability of attrition		-0.303*** (0.0225)		0.0451* (0.0192)		0.0371*** (0.00880)
South Africa						
<i>Without weights</i>						
<i>Wave 1 to 2</i>						
Outcome variable	-0.247*** (0.0574)		0.0775 (0.0547)		-0.0361 (0.0477)	
Probability of attrition		-0.288*** (0.0687)		0.131 (0.0984)		-0.0628 (0.0767)
<i>Wave 2 to 3</i>						
Outcome variable	-0.0909* (0.0460)		-0.0252 (0.0424)		-0.0491 (0.0387)	
Probability of attrition		-0.0951 (0.0495)		-0.0313 (0.0620)		-0.0704 (0.0617)
<i>With supplied weights</i>						
<i>Wave 1 to 2</i>						
Outcome variable	-0.154 (0.0974)		0.243* (0.110)		-0.0333 (0.0730)	
Probability of attrition		-0.167 (0.121)		0.378* (0.158)		-0.0527 (0.115)
<i>Wave 2 to 3</i>						
Outcome variable	-0.0972 (0.0756)		-0.0304 (0.0539)		-0.0208 (0.0533)	
Probability of attrition		-0.0826 (0.0920)		-0.0501 (0.0935)		-0.0148 (0.0889)

Source: IHDS (2005 and 2011/12) and NIDS (2008, 2010/11 and 2012), authors' calculations

Notes: Standard errors in parentheses. * p<.05, ** p<.01, *** p<.001, with significant coefficients on the variables displayed here indicating that attrition is non-random. All models include a complete set of control variables at baseline, as in the cross-sectional analysis. For South Africa, the supplied weights are the weights provided with the NIDS data to correct for non-random attrition.

Table C2. Random effects probit models for employment status, by country and gender

	India			South Africa		
	All	Men	Women	All	Men	Women
Household electricity access	-0.0185 (0.0401)	-0.219*** (0.0634)	0.120* (0.0513)	-0.0469 (0.0333)	-0.000576 (0.0518)	-0.0774+ (0.0427)
Male	1.303*** (0.0158)	--	--	0.606*** (0.0323)	--	--
Age (years)	--	--	--	0.145*** (0.00659)	0.106*** (0.00985)	0.165*** (0.00868)
Age squared	--	--	--	- 0.00169** * (0.0000697)	- 0.00139** * (0.000104)	- 0.00186** * (0.0000918)
Marital Status (Ref-widowed/divorced)						
Married	0.735*** (0.0201)	1.083*** (0.0409)	0.667*** (0.0232)	-0.0604 (0.0502)	0.349** (0.111)	-0.212*** (0.0582)
Single	-0.280*** (0.0271)	0.0688 (0.0438)	-0.0611 (0.0468)	-0.256*** (0.0550)	-0.336** (0.118)	-0.112+ (0.0623)
Other	--	--	--	-1.112 (0.683)	-0.773 (1.040)	-1.214 (0.896)
Years of education	-0.000528 (0.00390)	0.0812*** (0.00571)	- 0.0334** * (0.00566)	-0.0374** (0.0121)	-0.0203 (0.0192)	-0.0430** (0.0153)
Years of education squared	0.000337 (0.000302)	- 0.00424** * (0.000399)	0.00128* * (0.000494)	0.00688** * (0.000916)	0.00532** * (0.00143)	0.00743** * (0.00117)
Home ownership	-0.108* (0.0443)	0.0547 (0.0724)	-0.209*** (0.0572)	0.462*** (0.0359)	0.647*** (0.0548)	0.315*** (0.0475)
Household assets	- 0.0364*** (0.00152)	- 0.0265*** (0.00224)	- 0.0421** * (0.00205)	0.0275*** (0.00455)	0.0321*** (0.00706)	0.0245*** (0.00588)

	India			South Africa		
	All	Men	Women	All	Men	Women
Highest education of an adult in the household (years)	- 0.00912** * (0.00171)	- 0.0139*** (0.00275)	- 0.00671* * (0.00217)	-0.0203*** (0.00554)	- 0.0381*** (0.00924)	-0.0130+ (0.00682)
No. of children (0-14 years)	0.0310*** (0.00382)	0.0534*** (0.00589)	0.0232** * (0.00502)	0.00378 (0.00890)	0.0199 (0.0147)	-0.0180 (0.0111)
No. of teens (15-21 years)	-0.00978+ (0.00553)	- 0.0546*** (0.00814)	0.0299** * (0.00746)	0.0183 (0.0141)	0.00505 (0.0223)	0.0206 (0.0178)
No. of adults (22+ years)	- 0.0738*** (0.00397)	- 0.0519*** (0.00580)	-0.104*** (0.00549)	-0.0324** (0.0108)	-0.0396* (0.0167)	-0.0128 (0.0140)
Log(consumption)	- 0.0325*** (0.00414)	0.0284*** (0.00642)	- 0.0775** * (0.00544)	0.319*** (0.0197)	0.314*** (0.0301)	0.331*** (0.0258)
Constant	0.276*** (0.0581)	0.535*** (0.0937)	0.741*** (0.0763)	-6.668*** (0.296)	-4.529*** (0.454)	-7.703*** (0.391)
Panel-level variance $\ln(\sigma_v^2)$	-0.540*** (0.0346)	-0.886*** (0.0686)	-0.417*** (0.0415)	-0.238*** (0.0639)	-0.331** (0.107)	-0.306*** (0.0832)
Sample size	105,977	53,943	52,034	20,854	7,810	13,044

Source: IHDS (2005 and 2011/12) and NIDS (2008, 2010/11 and 2012), authors' calculations

Notes: Standard errors in parentheses. All models also contain controls for social group not shown here. + p<.10, * p<.05, ** p<.01, *** p<.001. The dependent variable takes on a value of one if the individual works at least 240 hours per year, zero otherwise.

Table C3. Fixed effects regression models for log of annual earnings, by country and gender

	India			South Africa		
	All	Men	Women	All	Men	Women
Household electricity access	0.101*** (0.0285)	0.0943** (0.0357)	0.103* (0.0469)	0.138* (0.0629)	0.0753 (0.0863)	0.195* (0.0932)
Age (years)	--	--	--	0.121*** (0.0338)	0.163*** (0.0445)	0.0538 (0.0528)
Age squared	--	--	--	-0.000427 (0.000403)	- 0.000903 + (0.000536)	0.000291 (0.000623)

	India			South Africa		
	All	Men	Women	All	Men	Women
Marital Status						
Married	0.193*** (0.0202)	0.192*** (0.0213)	-0.126** (0.0406)	-0.0577 (0.105)	0.0360 (0.171)	-0.124 (0.136)
Single	reference	reference	-0.250* (0.101)	-0.0344 (0.112)	0.0267 (0.185)	-0.0635 (0.145)
Widowed/divorced	0.317*** (0.0374)	0.326*** (0.0551)	reference	reference	reference	reference
Other	--	--	--	-0.0305 (0.871)	0 (.)	-0.0588 (0.878)
Years of education	-0.00574 (0.00575)	-0.00587 (0.00666)	-0.00302 (0.0118)	-0.0108 (0.0546)	-0.0488 (0.0730)	0.103 (0.0880)
Years of education squared	0.000696 (0.000470)	0.000743 (0.000527)	- 0.0000585 (0.00113)	0.000564 (0.00320)	0.00152 (0.00443)	-0.00313 (0.00476)
Home ownership	0.0482 (0.0329)	0.0342 (0.0402)	0.0835 (0.0569)	0.00961 (0.0559)	-0.0310 (0.0756)	0.0179 (0.0841)
Household assets	0.0518*** (0.00135)	0.0506*** (0.00162)	0.0534** * (0.00245)	-0.00694 (0.00656)	-0.00562 (0.00858)	-0.00904 (0.0103)
Highest education of an adult in the household (years)	0.00826** * (0.00176)	0.00979** * (0.00222)	0.00442 (0.00289)	0.0276+ (0.0142)	0.0175 (0.0214)	0.0434* (0.0194)
No. of children (0-14 years)	- 0.0260*** (0.00379)	- 0.0207*** (0.00449)	- 0.0409** * (0.00715)	-0.0530* (0.0218)	-0.0484 (0.0326)	-0.0594* (0.0300)
No. of teens (15-21 years)	- 0.0407*** (0.00470)	- 0.0441*** (0.00553)	- 0.0313** * (0.00896)	-0.00526 (0.0290)	-0.00271 (0.0438)	-0.00256 (0.0393)
No. of adults (22+ years)	- 0.0266*** (0.00419)	- 0.0297*** (0.00480)	-0.0140 (0.00875)	0.0142 (0.0255)	0.0108 (0.0399)	0.0126 (0.0335)

	India			South Africa		
	All	Men	Women	All	Men	Women
Hours worked/year	0.898*** (0.00734)	0.908*** (0.00915)	0.878*** (0.0122)	0.108*** (0.0244)	0.118*** (0.0350)	0.100** (0.0346)
Self-employed	-0.0486+ (0.0279)	-0.0828* (0.0329)	0.0679 (0.0525)	-0.502*** (0.0886)	-0.448*** (0.120)	-0.575*** (0.133)
Constant	2.053*** (0.103)	2.281*** (0.104)	2.295*** (0.186)	4.567*** (0.761)	4.171*** (1.007)	5.087*** (1.182)
Sample size	41,066	27,788	13,278	5,565	2,801	2,764

Source: IHDS (2005 and 2011/12) and NIDS (2008, 2010/11 and 2012), authors' calculations

Notes: Standard errors in parentheses. All models also contain controls for social group not shown here. + p<.10, * p<.05, ** p<.01, *** p<.001.

Table C4. Fixed effects regression models for log of annual earnings with correction for non-random attrition, by country and gender

	India			South Africa		
	All	Men	Women	All	Men	Women
Household electricity access	0.103*** (0.0272)	0.0960** (0.0356)	0.105** (0.0407)	0.178+ (0.0942)	0.150 (0.142)	0.183+ (0.104)
Age (years)	--	--	--	0.108* (0.0428)	0.146* (0.0580)	0.0494 (0.0529)
Age squared	--	--	--	-0.000387 (0.000513)	-0.000829 (0.000704)	0.000200 (0.000636)
Marital Status						
Married	0.195*** (0.0212)	-0.125* (0.0567)	0.0874 (0.154)	-0.0355 (0.0954)	-0.0531 (0.133)	-0.0143 (0.137)
Single	0.307*** (0.0460)	-0.320*** (0.0598)	-0.202 (0.168)	-0.123 (0.108)	-0.183 (0.150)	-0.0409 (0.152)
Widowed/divorced	reference	reference	reference	reference	reference	reference
Other	--	--	--	-0.0291 (0.101)	0 (.)	-0.00930 (0.132)
Years of education	-0.00606 (0.00634)	-0.00601 (0.00709)	-0.00336 (0.0146)	-0.0381 (0.0729)	-0.141 (0.0945)	0.103 (0.0849)
Years of education squared	0.000687 (0.000599)	0.000722 (0.000646)	- 0.000073 0 (0.00164)	0.00107 (0.00406)	0.000710 (0.00624)	-0.000663 (0.00541)

	India			South Africa		
	All	Men	Women	All	Men	Women
Home ownership	0.0416 (0.0336)	0.0304 (0.0405)	0.0699 (0.0585)	-0.0838 (0.0824)	-0.0645 (0.112)	-0.102 (0.117)
Household assets	0.0516*** (0.00137)	0.0503** * (0.00164)	0.0532** * (0.00254)	-0.000839 (0.00994)	-0.00567 (0.0144)	0.00478 (0.0120)
Highest education of an adult in the household (years)	0.00862** * (0.00174)	0.0100** * (0.00219)	0.00502+ (0.00283)	0.0417* (0.0166)	0.0372 (0.0228)	0.0629* (0.0265)
No. of children (0-14 years)	- 0.0251*** (0.00394)	- 0.0198** * (0.00468)	- 0.0400** * (0.00728)	-0.0605+ (0.0328)	-0.0344 (0.0551)	-0.0796* (0.0373)
No. of teens (15-21 years)	- 0.0396*** (0.00476)	- 0.0429** * (0.00558)	- 0.0302** * (0.00887)	-0.0217 (0.0350)	0.0141 (0.0500)	-0.0441 (0.0442)
No. of adults (22+ years)	- 0.0280*** (0.00435)	- 0.0306** * (0.00501)	-0.0167+ (0.00855)	0.00339 (0.0295)	-0.0129 (0.0486)	0.00148 (0.0361)
Hours worked/year	0.896*** (0.00854)	0.905*** (0.0111)	0.876*** (0.0127)	0.0859* (0.0340)	0.108+ (0.0572)	0.0760* (0.0340)
Self-employed	-0.0541+ (0.0282)	-0.0895** (0.0332)	0.0709 (0.0529)	-0.521*** (0.156)	-0.570* (0.232)	-0.452** (0.168)
Constant	2.216*** (0.0945)	2.669*** (0.132)	2.133*** (0.272)	5.411*** (1.058)	5.693*** (1.358)	5.185*** (1.372)
Sample size	28,762	20,240	8,522	5,555	2,794	2,761

Source: IHDS (2005 and 2011/12) and NIDS (2008, 2010/11 and 2012), authors' calculations

Notes: Standard errors in parentheses. Estimates are weighted to correct for non-random attrition using inverse probability weights. All models also contain controls for social group not shown here. + p<.10, * p<.05, ** p<.01, *** p<.001.

Table C5. Random effects regression models for log of annual earnings, by country and gender

	India			South Africa		
	All	Men	Women	All	Men	Women
Household electricity access	0.0300+ (0.0168)	0.0323 (0.0217)	0.0359 (0.0259)	-0.00636 (0.0329)	-0.00692 (0.0480)	-0.0101 (0.0446)

	India			South Africa		
	All	Men	Women	All	Men	Women
Male	0.450*** (0.00732)	--	--	0.386*** (0.0299)	--	--
Age (years)	--	--	--	0.0479*** (0.00796)	0.0577*** (0.0113)	0.0355** (0.0114)
Age squared	--	--	--	- 0.000411** * (0.0000923)	- 0.000565** * (0.000129)	- 0.000228 + (0.00013 5)
Marital Status (Ref- widowed/divorce d)						
Married	-0.0374** (0.0127)	0.0183 (0.0253)	- 0.0809*** (0.0140)	0.152** (0.0525)	0.273** (0.104)	0.0865 (0.0609)
Single	-0.181*** (0.0160)	-0.131*** (0.0271)	-0.160*** (0.0326)	0.118* (0.0555)	0.163 (0.109)	0.124+ (0.0637)
Other	--	--	--	0.135 (0.816)	0 (.)	0.111 (0.809)
Years of education	- 0.0213*** (0.00203)	- 0.0193*** (0.00250)	- 0.0363*** (0.00362)	-0.0498*** (0.0121)	-0.0421* (0.0185)	- 0.0548** * (0.0156)
Years of education squared	0.00312** * (0.000152)	0.00252** * (0.000179)	0.00556** * (0.000315)	0.00981*** (0.000821)	0.00861*** (0.00126)	0.0108** * (0.00106)
Home ownership	0.0325+ (0.0190)	0.0343 (0.0243)	0.0302 (0.0297)	0.106*** (0.0319)	0.0848+ (0.0452)	0.127** (0.0449)
Household assets	0.0569*** (0.000713)	0.0586*** (0.000884)	0.0499*** (0.00120)	0.0340*** (0.00396)	0.0341*** (0.00557)	0.0334** * (0.00558)
Highest education of an	0.00328** * (0.000152)	0.00717** * (0.000179)	-0.000752 (0.000315)	0.0289*** (0.000821)	0.0223* (0.00126)	0.0326** * (0.00106)

	India			South Africa		
	All	Men	Women	All	Men	Women
adult in the household (years)	(0.000929)	(0.00128)	(0.00131)	(0.00625)	(0.00969)	(0.00808)
No. of children (0-14 years)	-0.0140*** (0.00198)	-0.0133*** (0.00247)	-0.0168*** (0.00327)	-0.0285** (0.00898)	-0.0380** (0.0145)	-0.0259* (0.0113)
No. of teens (15-21 years)	-0.0258*** (0.00285)	-0.0239*** (0.00348)	-0.0254*** (0.00489)	0.00546 (0.0142)	0.0136 (0.0221)	0.00555 (0.0184)
No. of adults (22+ years)	-0.0226*** (0.00221)	-0.0250*** (0.00266)	-0.0183*** (0.00404)	-0.00319 (0.0108)	-0.00141 (0.0162)	-0.00470 (0.0143)
Hours worked/year	0.993*** (0.00376)	1.027*** (0.00488)	0.922*** (0.00578)	0.274*** (0.0147)	0.279*** (0.0215)	0.262*** (0.0202)
Self-employed	-0.132*** (0.0155)	-0.156*** (0.0189)	-0.0306 (0.0270)	-0.593*** (0.0392)	-0.412*** (0.0609)	-0.740*** (0.0504)
Constant	1.417*** (0.0396)	1.512*** (0.0539)	2.066*** (0.0659)	5.879*** (0.240)	6.115*** (0.352)	6.073*** (0.334)
Sample size	41,066	27,788	13,278	5,565	2,801	2,764

Source: IHDS (2005 and 2011/12) and NIDS (2008, 2010/11 and 2012), authors' calculations

Notes: Standard errors in parentheses. All models also contain controls for social group not shown here. + p<.10, * p<.05, ** p<.01, *** p<.001.

Table C6. Fixed effects regression models for log of annual hours worked, by country and gender

	India			South Africa		
	All	Men	Women	All	Men	Women
Household electricity access	-0.198*** (0.0365)	-0.177*** (0.0431)	-0.204** (0.0687)	0.177** (0.0606)	0.228** (0.0817)	0.119 (0.0905)
Age (years)	--	--	--	0.0333 (0.0314)	0.0391 (0.0404)	0.0246 (0.0494)
Age squared	--	--	--	-0.000171 (0.000368)	-0.000335 (0.000479)	0.0000444 (0.000574)
Marital Status (Ref-widowed/divorced)						
Married	0.0216	0.0603	-0.0845	-0.0720	0.00713	-0.116

	India			South Africa		
	All	Men	Women	All	Men	Women
	(0.0413)	(0.0622)	(0.0603)	(0.102)	(0.163)	(0.135)
Single	-0.148** (0.0485)	-0.0725 (0.0668)	-0.288+ (0.148)	-0.0615 (0.109)	0.0481 (0.176)	-0.116 (0.144)
Other	--	--	--	0.115 (0.872)	0 (.)	0.208 (0.898)
Years of education	-0.0139+ (0.00733)	-0.0144+ (0.00801)	-0.0154 (0.0171)	0.0189 (0.0540)	0.0345 (0.0700)	-0.0108 (0.0887)
Years of education squared	0.00176** (0.000598)	0.00142* (0.000634)	0.00376* (0.00164)	-0.000696 (0.00313)	0.00306 (0.00419)	-0.00399 (0.00477)
Home ownership	0.0370 (0.0419)	0.0626 (0.0484)	-0.0338 (0.0829)	0.105+ (0.0545)	0.0664 (0.0719)	0.154+ (0.0831)
Household assets	0.00118 (0.00230)	0.00352 (0.00260)	-0.00460 (0.00474)	0.0112+ (0.00648)	0.00423 (0.00829)	0.0206* (0.0102)
Highest education of an adult in the household (years)	-0.00216 (0.00225)	0.00172 (0.00269)	-0.0109** (0.00422)	0.00404 (0.0133)	-0.0322 (0.0205)	0.0239 (0.0180)
No. of children (0-14 years)	0.00675 (0.00508)	0.0130* (0.00566)	-0.0167 (0.0110)	-0.0455* (0.0207)	-0.0228 (0.0315)	-0.0673* (0.0279)
No. of teens (15-21 years)	-0.0193** (0.00620)	-0.0138* (0.00691)	-0.0285* (0.0134)	-0.0130 (0.0282)	-0.0507 (0.0424)	0.000973 (0.0382)
No. of adults (22+ years)	-0.0173** (0.00539)	- 0.0268*** (0.00585)	0.0195 (0.0128)	-0.0202 (0.0245)	0.0172 (0.0373)	-0.0502 (0.0330)
Self-employed	-0.474*** (0.0352)	-0.537*** (0.0391)	-0.271*** (0.0763)	0.239** (0.0783)	0.188+ (0.109)	0.259* (0.113)
Log(consumption)	- 0.0279*** (0.00423)	- 0.0178*** (0.00482)	- 0.0548** * (0.00863)	-0.00303 (0.0278)	0.0388 (0.0366)	-0.0587 (0.0424)
Constant	7.636***	7.402***	7.839***	5.986***	5.542***	6.724***

	India			South Africa		
	All	Men	Women	All	Men	Women
	(0.0974)	(0.136)	(0.239)	(0.743)	(0.968)	(1.155)
Sample size	41,072	27,796	13,276	6,269	3,024	3,245

Source: IHDS (2005 and 2011/12) and NIDS (2008, 2010/11 and 2012), authors' calculations

Notes: Standard errors in parentheses. All models also contain controls for social group not shown here. + p<.10, * p<.05, ** p<.01, *** p<.001.

Table C7. Fixed effects regression models for log of annual hours worked with correction for non-

random attrition, by country and gender

	India			South Africa		
	All	Men	Women	All	Men	Women
Household electricity access	-0.199*** (0.0394)	-0.180*** (0.0469)	-0.202** (0.0721)	0.147* (0.0710)	0.273** (0.0955)	-0.0173 (0.103)
Age (years)	--	--	--	0.0334 (0.0356)	0.0337 (0.0429)	0.0400 (0.0608)
Age squared	--	--	--	-0.000135 (0.000432)	-0.000340 (0.000550)	0.0000733 (0.000707)
Marital Status (Ref-widowed/divorced)						
Married	0.169*** (0.0255)	0.0663 (0.0632)	0.220+ (0.120)	0.0171 (0.125)	0.0159 (0.135)	-0.0276 (0.214)
Single	-0.141** (0.0478)	-0.0662 (0.0686)	-0.297* (0.121)	0.0679 (0.164)	0.115 (0.161)	-0.0314 (0.272)
Other	--	--	--	0.147 (0.120)	0 (.)	0.273 (0.174)
Years of education	-0.0126+ (0.00703)	-0.0137+ (0.00782)	-0.0123 (0.0159)	-0.000733 (0.0550)	0.0849 (0.0769)	-0.0645+ (0.0374)
Years of education squared	0.00164** (0.000564)	0.00134* (0.000616)	0.00357* (0.00138)	0.000153 (0.00292)	0.00124 (0.00411)	-0.00148 (0.00321)
Home ownership	0.0309 (0.0387)	0.0589 (0.0459)	-0.0514 (0.0721)	0.138+ (0.0809)	0.116 (0.102)	0.125 (0.129)
Household assets	0.00168 (0.00226)	0.00385 (0.00255)	-0.00403 (0.00469)	0.00282 (0.0105)	0.00220 (0.0137)	0.00729 (0.0153)
Highest education of an adult in the household (years)	-0.00258 (0.00229)	0.00119 (0.00274)	-0.0112** (0.00413)	0.00532 (0.0186)	-0.0342 (0.0221)	0.0329 (0.0292)
No. of children (0-14 years)	0.00704 (0.00534)	0.0128* (0.00584)	-0.0156 (0.0121)	-0.0683* (0.0272)	-0.0337 (0.0337)	-0.0973* (0.0400)
No. of teens (15-21 years)	-0.0202**	-0.0146*	-0.0295*	-0.0156	-0.0669	0.00967

	India			South Africa		
	All	Men	Women	All	Men	Women
	(0.00632)	(0.00706)	(0.0138)	(0.0397)	(0.0512)	(0.0580)
No. of adults (22+ years)	-0.0171** (0.00527)	- 0.0259*** (0.00570)	0.0191 (0.0129)	0.0233 (0.0333)	0.0548 (0.0422)	-0.0103 (0.0486)
Self-employed	-0.479*** (0.0433)	-0.539*** (0.0498)	-0.278** (0.0866)	0.345** (0.126)	0.340+ (0.185)	0.295* (0.149)
Log(consumption)	- 0.0272*** (0.00419)	- 0.0171*** (0.00472)	- 0.0548** * (0.00871)	0.0113 (0.0344)	0.0455 (0.0429)	-0.0696 (0.0561)
Constant	7.264*** (0.0859)	7.682*** (0.116)	7.532*** (0.245)	5.790*** (0.856)	5.370*** (1.042)	6.480*** (1.405)
Sample size	36,234	24,628	11,606	6,258	3,017	3,241

Source: IHDS (2005 and 2011/12) and NIDS (2008, 2010/11 and 2012), authors' calculations

Notes: Standard errors in parentheses. Estimates are weighted to correct for non-random attrition using inverse probability weights. All models also contain controls for social group not shown here. + p<.10, * p<.05, ** p<.01, *** p<.001.

Table C8. Random effects regression models for log of annual hours worked, by country and gender

	India			South Africa		
	All	Men	Women	All	Men	Women
Household electricity access	- 0.0921*** (0.0221)	-0.106*** (0.0267)	-0.0296 (0.0389)	0.0768** (0.0288)	0.0453 (0.0413)	0.0995* (0.0400)
Male	0.401*** (0.00949)	--	--	0.137*** (0.0262)	--	--
Age (years)	--	--	--	0.0262*** (0.00571)	0.0155+ (0.00825)	0.0324*** (0.00792)
Age squared	--	--	--	- 0.000353* ** (0.0000617)	- 0.000247* * (0.0000894)	- 0.000431* ** (0.0000853)
Marital Status (Ref-widowed/divorced)						
Married	-0.129*** (0.0167)	0.0624* (0.0311)	-0.214*** (0.0209)	0.0719 (0.0443)	0.132 (0.0880)	-0.0293 (0.0536)

	India			South Africa		
	All	Men	Women	All	Men	Women
Single	-0.147*** (0.0210)	0.0602+ (0.0334)	-0.176*** (0.0487)	0.0518 (0.0475)	-0.0425 (0.0926)	0.105+ (0.0571)
Other	--	--	--	0.254 (0.793)	0 (.)	0.273 (0.809)
Years of education	-0.00397 (0.00267)	-0.00571+ (0.00309)	-0.0134* (0.00541)	0.00738 (0.0103)	-0.00573 (0.0153)	0.0177 (0.0137)
Years of education squared	0.00230** * (0.000200)	0.00176** * (0.000221)	0.00475** * (0.000469)	0.000697 (0.000717)	0.00182+ (0.00106)	-0.000355 (0.000968)
Home ownership	0.226*** (0.0248)	0.201*** (0.0297)	0.258*** (0.0441)	0.277*** (0.0291)	0.239*** (0.0397)	0.298*** (0.0427)
Household assets	0.0310*** (0.00106)	0.0363*** (0.00121)	0.0171*** (0.00208)	0.0157*** (0.00372)	0.0112* (0.00510)	0.0201*** (0.00541)
Highest education of an adult in the household (years)	- 0.0113*** (0.00121)	- 0.00653** * (0.00157)	- 0.0147*** (0.00195)	-0.00109 (0.00516)	-0.0137+ (0.00798)	0.00752 (0.00677)
No. of children (0-14 years)	-0.00288 (0.00266)	0.0139*** (0.00311)	- 0.0365*** (0.00499)	-0.0230** (0.00815)	0.00739 (0.0128)	-0.0496*** (0.0106)
No. of teens (15-21 years)	- 0.0306*** (0.00378)	- 0.0269*** (0.00435)	- 0.0284*** (0.00737)	0.00265 (0.0127)	-0.0122 (0.0190)	0.0138 (0.0170)
No. of adults (22+ years)	- 0.0277*** (0.00289)	- 0.0394*** (0.00326)	-0.00591 (0.00603)	0.0218* (0.00960)	0.0179 (0.0141)	0.0284* (0.0131)
Self-employed	-0.547*** (0.0200)	-0.645*** (0.0227)	-0.291*** (0.0400)	0.0608+ (0.0356)	0.0646 (0.0533)	0.0415 (0.0477)
Log(consumption)	- 0.0644*** (0.00266)	- 0.0523*** (0.00309)	- 0.0876*** (0.00510)	0.0355* (0.0162)	0.0699** (0.0224)	0.0141 (0.0234)

	India			South Africa		
	All	Men	Women	All	Men	Women
Constant	7.361*** (0.0413)	7.402*** (0.0537)	7.738*** (0.0803)	6.017*** (0.229)	6.383*** (0.331)	5.844*** (0.324)
Sample size	41,072	27,796	13,276	6,269	3,024	3,245

Source: IHDS (2005 and 2011/12) and NIDS (2008, 2010/11 and 2012), authors' calculations

Notes: Standard errors in parentheses. All models also contain controls for social group not shown here. + p<.10, * p<.05, ** p<.01, *** p<.001.